

# AUTOMOTIVE INDUSTRIES

## AUTOMOBILE

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Number 3

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DON BLANCHARD, Editor

JEROME H. FARRIS, Ass't Editor

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 J. S. HILDRETH, Vice-Pres. and Director of Sales  
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### OFFICES

New York—239 W. 39th St., Phone Pennsylvania 6-1100. Chicago—Room 1116 London Guarantee & Accident Bldg., Phone Franklin 9494. Detroit—814 Stephenson Bldg., Phone Madison 2090. Cleveland—1140 Guardian Bldg., Phone Main 6860. Boston—301 United Shoe Bldg., Phone Liberty 4460. San Francisco—444 Market St., Room 305, Phone Garfield 6788. Long Beach, Cal.—1595 Pacific Ave., Phone Long Beach 613-238. Portland, Ore.—72 Fifth St. Entered as second-class matter Oct. 1, 1925, at the post office at Philadelphia, Pa., under the act of March 3, 1879. Cable Address ..... Autoland, Philadelphia

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PRESERVATION IS INSTINCTIVE



Hercules held the heavens while Atlas went in quest of the Golden Apples for him. Returning, the task effected, Atlas was loath to take up his burden again but Hercules managed to give the heavens back to him, on the pretent that he wanted relief for only a moment, while he cushioned his shoulders.

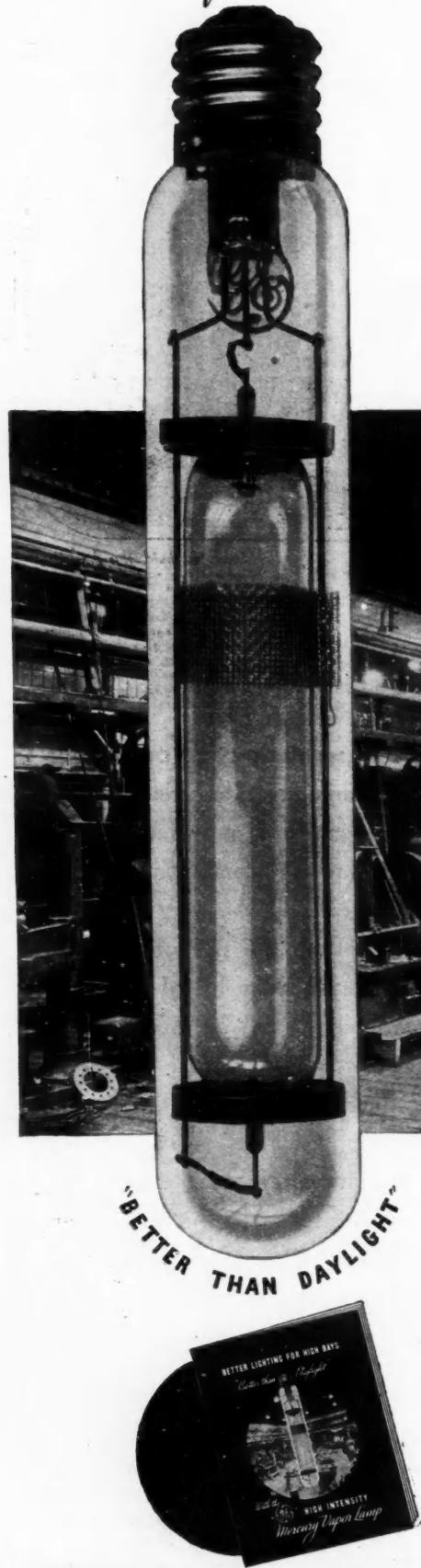


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35 lumens per watt assure both sufficient and efficient intensity for the high bays. Compare this with your own, then judge. But the G. E. High Intensity Mercury Vapor Lamp with its whiter sensation adds—better light for better sight. It illuminates the shadows with its penetrating power increasing the rate of eye response and minimizing eye fatigue; increasing production quality while minimizing accident hazards. This better light means better sight—and better and more economical production . . . General Electric Vapor Lamp Company, 801 Adams Street, Hoboken, N. J.

**GENERAL  ELECTRIC  
VAPOR LAMP COMPANY**

605 Copr. 1934, General Electric Vapor Lamp Co.

*The story of "Better Lighting For High Bays" is briefly told in this bulletin. Write for a copy*

# AUTOMOTIVE INDUSTRIES

Vol. 72, No. 3

THIRTY-SEVENTH YEAR

January 19, 1935

## Unions Plan Drive for Power

### Strike Unlikely; May Stage Demonstration for Congress

#### IN THIS ISSUE

Abstracts of papers presented at the

ANNUAL S. A. E. Meeting include

R. D. Evans' paper on the effect of several factors on tires

E. S. Dennison with a new method of analyzing Indicator Cards

Elliott G. Reid presenting some interesting data derived from wind tunnel tests

From the Production Symposium some profitable material is given

From other sessions comes the latest developments

by Athel F. Denham

Detroit Editor, Automotive Industries

Are we to have a general strike in the automotive industry this spring? Present indications are to the contrary, BUT the chances are that a general strike may be threatened along and simultaneously with similar threats in the rubber, steel, and textile industries. Furthermore, strikes at specific individual, and perhaps key plants are not out of the question.

The strike question is one which from all indications will in a few weeks become a major topic of discussion, par-

ticularly following the meeting of executive council of the A. F. of L. in Washington, Jan. 29. Already for that matter there has been considerable argument on the topic in this industry. Automotive locals have been preparing "demands" to present to automotive manufacturers and the same thing is true in other industries, it is reported.

A major "labor" demonstration undoubtedly will be made this spring with an eye to an influence over Congress and as a possible means of reaching A. F. of L. objectives.

The first concrete evidence, however, (Turn to page 72, please)

## SAE Discusses Technical Advances, Needs at Annual Meeting in Detroit

by Don Blanchard

Editor, Automotive Industries

DETROIT, Jan. 16—With a registration total in excess of 2,000 practically certain, the Society of Automotive Engineers is holding one of its most successful annual meetings here this week. The large registration has been reflected in unusually good crowds at the technical sessions and at the exhibition of automotive equipment which the society is staging in conjunction with the meeting.

Monday's sessions, with the exception of the student event in the evening, were devoted to land commercial transportation, and covered such subjects as paint, buying trucks, uses of rubber and vehicle design from the standpoint of the operator. In discussing the last of these topics, F. L. Faulkner, Armour and Co., placed some emphasis on the inadequacy and inconsistency of truck electrical equipment from the capacity standpoint. He suggested that truck manufacturers reduce present bright-plating expenditures by the amount necessary to furnish adequate electrical systems.

The program for the student session was provided by Johns-Manville who put on an interesting presentation of acoustics and

their automotive application. The speakers were H. R. Berlin and J. H. Parkinson. Approximately 1,100 attended this session.

Aircraft engines were the topic at Tuesday's technical sessions. At one of them, J. F. Campbell, of the Army Air Corps, (Turn to page 73, please)



D. G. "BARNEY" ROOS  
SAE President who presided at the annual meeting

## Job Insurance Law Asked by President

Old Age Pensions and Child  
Child Aid Laws Proposed  
in Social Security Message

President Roosevelt has definitely committed himself and his Administration to a broad program of social legislation embracing unemployment insurance, old age pensions and child aid in his message on social security delivered to Congress Thursday. The President's address was based upon the report of a survey of this subject made by his Committee on Economic Security.

Mr. Roosevelt said that unemployment as "we" conceive it is the front line of defense for those ordinarily steadily employed and especially beneficial in maintaining purchas-

(Turn to page 72, please)

## Committee Urges Prompt Studebaker Stock Deposit

To make the Studebaker Corp. a going concern reorganization must be consummated as quickly as possible, and to make the necessary reorganization possible holders of the corporation's preferred stock have been urged to deposit their holdings by a committee of preferred stockholders interested in the plan. Hearings on the plan are to be held in the United States District Court at Fort Wayne Jan. 25.

In part the letter says "the Studebaker enterprise . . . faces two alternatives: either liquidation or reorganization with adequate working capital and low fixed charges. . . . This committee feels strongly that the Studebaker Corporation should be reorganized promptly as a going concern. To accomplish this, additional working capital will have to be supplied." It also is pointed out that the existing debt of more than \$21,000,000 will have to be provided for.

The details of the Studebaker reorganization plan were reported in *Automotive Industries* Nov. 19, 1934.



These three GM executives are interested in what they see under the hood of the 1935 Master Chevrolet. From left to right, Alfred P. Sloan, Jr., president of GM; M. E. Coyle, president of Chevrolet, and W. S. Knudsen, GM executive vice-president.

## Employee Election Opposed by Bendix At NLRB Hearing; Requested by AFL

Testifying before the National Labor Relations Board on Monday Vincent Bendix said he believed a collective bargaining election among the employees of the Bendix Products Corp. at this time would cause strife and controversy and not serve the best public interest. Mr. Bendix's statement was made in reply to the request filed with the Board by the United Automobile Workers Federal Union, No. 18347, the A. F. of L. group in the Bendix plant, for such an election. Relative to the company's policy on employee relations, Mr. Bendix said the management had been receiving committees from both the A. F. of L. union and the Bendix Employees Association.

Mr. Bendix informed the Board he did not oppose collective bargaining, but rather had guaranteed it at all times. He also was apprehensive lest an election, with its possible consequences of quarreling, might have an adverse effect upon the company's business. Mr. Bendix said he feels he should meet with all groups of employees, and denied that the employees' association had been credited with achievements of the A. F. of L. on behalf of the employees.

Others who appeared at the hearing were Carl J. Shipley, president of the A. F. of L. union in the plant. He told the Board the majority of employees wanted the election to clear up the present controversy, indicating that his organization had the majority of Bendix workers in its membership,

and that public interests would be better served by holding the requested election. W. C. Metzger, chairman of the employees association, said he believed the present friction between the two organizations would continue and be enhanced by the election.

Carlton Ogburn, union attorney, argued for the election order, saying that no real collective bargaining could be had where the employees are separated into rival groups. Opposed to Mr. Ogburn was E. H. Cassells, attorney for the company.

### Consolidation of Code Authorities Proposed

Tentative and experimental plans for the consolidation of national and wholesale, and wholesale and retail code authorities in the distribution field where feasible to effect economy of operation and greater efficiency have been outlined by H. C. Carr, divisional administrator of NRA. Last week Mr. Carr presented his proposal to a meeting of 34 retail and wholesale code authorities.

The fact was emphasized that the plan is experimental in character and was submitted solely for consideration. Among the code authorities present at the meeting were representatives of the retail tire and battery trade. However, the plan has been suggested to cover all retail and wholesale code groups, par-

ticularly in the distribution field. In explaining his plan Mr. Carr said that the NRA felt proper administration of codes cannot be accomplished from the offices of the national code authorities. In certain places, it was stated, men forming some local code authorities already have combined.

During the meeting Mr. Carr also proposed that the administration appoint administration members to local code authorities in certain metropolitan areas. He explained this proposal by saying that the degree of cooperation between local and national authorities has not been close enough. He emphasizes the fact that NRA does not want to lose sight of its present policy of handling all matters on a given code through its national code authority and is often brought into contact with some of the more important local code authorities. In order to aid both the code authorities and the administration he made the proposal outlined here.

### GM Foreign Sales Make Record Gain of 81% in '34

General Motors sales abroad in 1934 totaled 220,560 units, representing an increase of 81.3 per cent over 1933. For the month of December sales were 16,425 units, a gain of 80.4 per cent over the corresponding month of 1933, and the highest December volume recorded since 1928. These volumes relate to sales of cars and trucks of General Mo-

tors manufacture from American, English and German sources.

Sales of the Vauxhall product in England and the Opel product in Germany showed substantial gains during 1934, but the heaviest increases occurred in the instance of the export sales of products manufactured in the United States, with volumes running currently 135 per cent over the volume of a year ago.

### Borg-Warner Buys Control of Marbo Products Corp.

Borg-Warner Corp. has purchased an interest in Marbo Products Corp. of Chicago, which holds patents covering a new process for the manufacture of

Rubber Hydrochloride and its derivative products. William P. Hemphill, of Chicago, has been elected president of the Marbo company.

The directors of the Marbo Corp. are: George W. Borg, chairman of the board, Borg-Warner Corp.; Paul H. Davis, Paul H. Davis & Company, investment bankers; Howard E. Blood, president, Norge Corp.; George B. Dryden, president, Dryden Rubber Co.; Floyd E. Williams, vice-president, Marbo Products Corp.; William P. Hemphill, president, Marbo Products Corp.

The Borg-Warner Corp. obtained all the preferred stock of the Marbo company. This stock interest gives Borg-Warner the privilege of naming a majority of Marbo's directorate.

## Industry Off To Flying Start as Early Jan. Deliveries Double Same '34 Period

by Athel F. Denham

Detroit Editor, *Automotive Industries*

The automotive industry so far this month has got away to a flying start, not only on a production basis as previously reported, but also in retail deliveries. Based on field reports for the first two weeks of January in some cases and first 10 days in others, January deliveries of passenger cars promise to approximately double retail sales for January of last year.

Based on figures for the period mentioned retail deliveries for the month are running at a rate which should show a final total of about 120,000 passenger cars at least. January last year the industry's dealers delivered some 63,000 passenger cars domestically. Last year, of course, retail sales were delayed because of the tool and die strike which hindered new model production so that comparisons cannot be accepted as that much of an increase in actual consumer demand.

A more significant comparison is with previous years and in which the January estimate for this year is better than for any previous year since 1930 or 1931. January, 1931, totals may be exceeded, although it is unlikely the 1930 figure will be reached.

Trucks so far this month have not picked up as well as passenger car sales, if anything they are slightly less than January of last year. This can be partially explained when it is recalled that last year dealers pushed trucks more aggressively, having no passenger cars in stock.

Plymouth sales for the week ending Jan. 12 showed an all-time shipment record of 11,730 cars for a single week according to factory releases. Retail deliveries of Plymouths for the first two weeks of this month totaled 8993 units compared with 3317 units in same period last year.

Pontiac retail deliveries for the first 10 days of January were approximately four times the total for the same period last year.



Miniature model of center aisle of Chicago Show

### U. S. Court Reserves Houde Case Decisions

#### Briefs on Co.'s Petition and Those of Employees Ordered Filed by Judge

Decisions on the petition of the Houde Engineering Corp. that the government be ordered to amend and make more specific its bill of complaint against the company, and the petitions of Joseph W. Dambach and the Houde Welfare and Athletic Association to be allowed to intervene in the suit have been reserved by Judge John Knight sitting in the United States District Court for western New York at Buffalo.

Judge Knight has heard argument by A. R. Moore, attorney for William P. McGahan, a Houde employee, who also seeks to intervene in the action. Mr. Moore pointed out that his client is now working under a personal agreement with the corporation management and that his rights will be materially affected if the government is successful in its suit. Briefs in all cases were ordered filed by Judge Knight. Providing a new and more specific bill of complaint is not ordered the Houde Corporation must file it answer to the original bill within 10 days after the decision has been rendered.

### New Budd Co. Officials

Sylvester A. Mahan has been appointed works manager of the Philadelphia plant of the Edward G. Budd Manufacturing Company and Joseph W. Meadowcroft, assistant works manager, the company has announced. Earl Blaine has been appointed chief inspector.

## NADA Proposes New Contracts and Code Revisions at Annual Convention

DETROIT, Jan. 16—Factory-dealer relationships held the center of the stage at the annual convention of the National Automobile Dealers Association which closed here last night. F. W. A. Vesper, president of the organization, sounded the keynote of the meeting in a vigorous opening address when he presented the most comprehensive and ambitious program for 1935 that the association has had since Warren Griffith was president in 1929.

The keystone of the program, which was subsequently endorsed by unanimous resolution of the convention, is that dealers should net a profit commensurate with risk and effort. To attain this objective, the association will seek a more equitable dealer franchise, the nature of which is indicated by the report of the contract revision committee. This report did not come before the membership but it is understood that it was adopted by the directors.

The report criticized present contracts as grossly inequitable because (1) they permit cancellation without adequate notice and do not provide for the disposition of inventories and other liabilities; (2) they do not provide protection against arbitrary reductions in discounts; (3) they enable factories arbitrarily to declare models obsolete without requiring factory participation in liquidation costs, and (4) they do not uniformly give adequate protection against price reductions. The report also recommended boards of arbitration to hear and settle factory-dealer disputes.

Mr. Vesper touched upon some of these points in his address. He criticized factories for offsetting code savings on used cars by reductions in new car gross margins, for over-packing dealers in some territories, and for using the clean-up provision of the code as a loophole through which costs of liquidating obsolete models were shifted to dealers. An effort will be made to close this loophole by revising the code. In taking these matters up with factories, Mr. Vesper indicated that NADA did not propose to wave the big stick but intended to handle the questions at issue by diplomatic negotiations. The association will confine itself to general dealer problems although it will inject itself into issues involving specific problems where necessary. Copies of Mr. Vesper's keynote speech are to be sent to every manufacturer and dealer.

The association adopted the following resolutions unanimously: (1) That dealers should receive the same mark-up on freight as on the car itself; (2) that a definition of an obsolete model should be included in the code stating that a car is obsolete only after public announcement by its manufacturer that it has been superseded by a new model and prices announced on the new model; (3) that the formula in the code for determining used car guide book values be amended (it is understood that it will

be proposed to NRA that all sales reports be averaged instead of eliminating the low 20 per cent as required at present), and that the association hold a members' meeting prior to June 1, 1935, to discuss problems that may arise out of the expiration or extension in modified form of the National Industrial Recovery Act.

The meeting was featured by speeches by E. H. McCarty, Nash president; B. E. Hutchinson, Plymouth board chairman; R. H. Grant, GM vice-president; W. J. Cameron, Ford; and James Dalton, editor of *Motor*.

Mr. McCarty said the Nash has been and is for the dealer code, pointing out that retailers can't prosper on profitless volume. He also emphasized that factories can't build permanent success on losses shifted to dealers, referring particularly to price reductions and clean-ups.

Some of the most controversial factory-dealer questions were discussed clearly and courageously by Mr. Hutchinson and it is unfortunate that his commendable frankness earned for him the courtesy of some elements in the audience who reacted in a thoroughly discreditable manner. After sketching the economic importance of the industry, Mr. Hutchinson urged cooperation in preventing tinkering with the machinery of the industry that would impede its efforts to bring national recovery.

Without referring to the dealer code directly, Mr. Hutchinson warned that the public is going to demand either free and unrestricted competition in the automotive industry, or some degree of governmental regulation. Subsequently he said that present factory-dealer relationships were the result of evolution and that the dealer body today was evidence that existing arrangements were preponderantly fair and equitable. Emphasizing that the relationship between a factory and a dealer is an individual one, he stressed that factories must always

remain free to bargain with their dealers individually without any outside interference by their own or the dealers' national association.

General Motors believes that industry will be better off under a well-devised, well-thought out, well-administered principle of used car control, Mr. Grant said. Furthermore he declared that the corporation was willing to be cooperative in that attitude with their dealers. He also revealed that the used car position of GM dealers was materially better in 1934 than in 1933, which improvement he attributed entirely to the code.

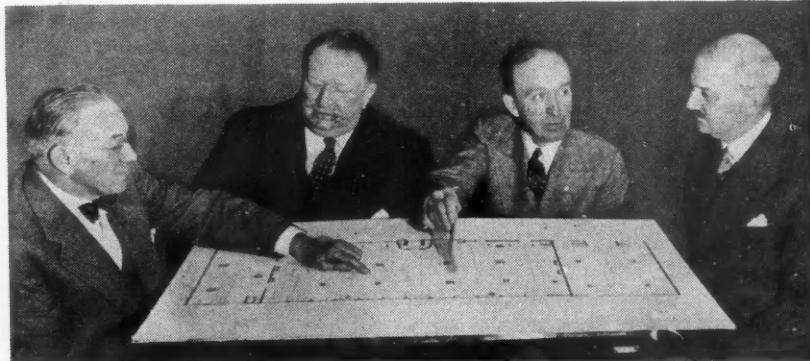
Although Mr. Cameron decried chiseling, gouging competition, he was entirely frank in revealing how he felt about NRA. He said that General Johnson was one of the most honest and upright men ever connected with any code. You always knew where he stood, Mr. Cameron continued, expressing regret that he was not given the privilege which every captain has of going down with his ship.

The treasurer's report revealed the association in flourishing condition with \$372,543 cash and surplus and reserves of nearly \$100,000. The membership in 1934 totaled 29,344 and this year paid-up memberships already have reached 14,800.

## To Consolidate Management Of Fisher Flint Plants

Management of the two Fisher Body plants in Flint will be consolidated about Feb. 1, according to a recent company announcement. E. J. Parker, who has been manager of plant No. 1 since 1930, will assume charge of the No. 2 plant in addition.

O. J. Stanitzke, who has been in charge of No. 2 plant, will be transferred to Buffalo to assume the management of the plant in that city when R. N. Wisner, now Buffalo manager, is moved to Baltimore to manage a new Fisher plant to be opened in the Maryland city.



Chicago Show Executives

From left to right, A. C. Faeh, manager; Harry T. Hollingshead, chairman of the show committee; M. J. Lanahan, president Chicago Automobile Trade Association and Alfred C. Reeves, AMA vice-president.

## Continental Motors

A reduction of nearly 50 per cent in the net loss for the year ending Oct. 31, 1934, from the previous year has been reported by the Continental Motors Corp. The report puts the net loss for the past year at \$1,977,620 compared with \$3,497,764 for the year ending Oct. 31, 1933. Current assets included \$75,581; accounts and notes receivable, \$106,385, and inventories, \$796,132. Current liabilities included accounts payable, \$212,356; accrued taxes, etc., \$424,695.

## ALB Plant Election Schedules Announced

The Automobile Labor Board has announced the following schedule of elections in automotive plants for the nominations and elections of collective bargaining representatives:

Jan. 22 and 23, nominating election, Dodge Brothers Corp., Detroit.

Jan. 25, final election, Dodge Forge Plant, Lynch Road Truck Plant and Amplex Division of Chrysler Corp.

Jan. 25, final election, Chrysler Highland Park plant.

A three dimensional picture designed by Russell Patterson (right) to show the effect of the new mohair velvet fabrics employed in the 1935 GM cars. The miniature is being exhibited as part of the Fisher Body display at the Detroit Show. At the left is W. S. McLean, Fisher advertising director



Jan. 29, final election, Plymouth Motor Corp.

Jan. 31 and Feb. 1, final election, Dodge Brothers Corp.

During the first two weeks in February elections will be held in the plants of the following companies: Packard Motor Car

Co., Chevrolet Gear and Axle Division of General Motors Corp., Hudson Motor Car Co., Kercheval and Jefferson Avenue plants of Chrysler Corp.

## Ford to Open Twin Cities Plant Latter Part of Feb.

The Ford Motor Co. plant in St. Paul, Minn., is expected to open the latter part of February, and when in full operation will employ 1,200 to 1,400 men, according to F. S. Reinhardt, manager. The daily output will be about 200 cars.

## A Correction

*Automotive Industries* last week said in conjunction with the report on the code price hearing before the NIRB "The company (referring to the Spielman Motor Sales Co. of New York) was haled before the Supreme Court of New York for alleged violation of the provision (trade-in allowance provision of the dealers' code). The Court ruled against the Spielman company, and an appeal to the Supreme Court was taken by the dealer."

David B. Spielman, president of the company, states this is incorrect and the right facts are that his company brought the action "to enjoin and restrain a threatened prosecution on the ground that the dealers' code was unconstitutional. The said Statutory Court went so far as to direct the District Attorney to show cause why he should not be restrained from carrying out his threatened prosecution."

These facts were set forth in the Aug. 24 issue of *Automotive Industries*. In the issue of Nov. 24 *Automotive Industries* reported that the Spielman company's effort to secure the injunction had failed before the U. S. District Court in New York and had filed its appeal to the United States Supreme Court on Nov. 10. At that time it was reported that the case was listed for argument before the U. S. Supreme Court on Dec. 9, 1934, however, the case has not yet been called.

## Industry Has Obligations to Regularize Production, Employment, Richberg Says

The automotive industry has a great obligation to regularize production, distribution and employment not in ten years but in one year, Donald R. Richberg told the annual banquet of the National Automobile Dealers Association in Detroit this week. His speech at times was pointedly critical of the industry and was directed primarily at automotive manufacturers of whom there was a liberal sprinkling present as guests of the dealers.

Although admitting that in some lines of activity, weather exercised such a dominating influence that regularization is impossible, he made it clear that he did not believe that the automotive industry was in this category, mentioning in this connection that highways were now suitable for all-year use and that finishes on cars were able to resist adverse weather. Continuing he emphasized that where regularization was possible, private industry should effect it without the compulsion of government. But he also warned that if business will not regulate itself to eliminate harmful practices, it will be regulated by government "to the queen's taste" although perhaps not to its own taste. In issuing this warning, he said he was not making a threat, but explaining a philosophy.

In the same vein, Mr. Richberg said that the alternative to collective bargaining was statutory regulation of employment conditions. He emphasized that if employees are unable to organize as workers, they will do so as voters. The only sure means of blocking political action along this line, Mr. Richberg stated, was through collective bargaining.

ing. He also stressed that workers should be free to organize and to bargain without coercion, and he made it clear that he was not referring only to coercion by employers.

As to NRA's future, he denied that it is either dead or moribund. He praised the accomplishments since NIRB took charge and added that they are now trying to make it run by exploding gas in the cylinder instead of in the exhaust pipe, obviously a dig at General Johnson.

The banquet attracted the largest crowd of dealers in NADA history—a total of about 1,500 in all. However, Mr. Richberg referred only briefly to the motor vehicle retail code. He gave his general approval to what the dealers are trying to do to improve their business practices which seemed to encourage those present to believe that the administration favored continuation of the present code provisions without major modification, despite all the shafts that are being aimed at price controls in NRA codes generally.

The balance of Mr. Richberg's speech was devoted largely to an exposition and defense of the New Deal, particularly as exemplified by NRA. He emphasized that the automotive industry stood to gain tremendously by the efforts to raise purchasing power and chided the industry because its attitude had not been more enthusiastically cooperative.

WASHINGTON, Jan. 17—Leon Henderson, chief of the NRA Division of Research and Planning, announced that the tentative report on the employment probe of the automotive industry will be submitted to President Roosevelt early next week.

## Motor Steel Orders Cover Wider Range

Car and Parts Makers Now Demanding Bars, Wire, Etc. Place Capacity at 47½%

Steel demand, having scored further gains as the result of buying by motor car manufacturers and parts makers, is now spread over a wider range of descriptions. For many weeks flat steels, especially sheets, were so predominantly prominent among automotive purchases that other steel products came in for very little attention. Now belated demand for merchant bars, alloy steels, wire products, bolts and nuts, etc., holds a prominent place among market activities. Heavier calls for both hot rolled and cold finished bars as well as alloy steel bars reflects the upward trend of assemblies.

Wheel manufacturers have stepped up their orders for wire, increased tonnages of which are also going into upholstery springs. Broader demand for automobile bolts accounts for increased activity in wire rods. Strip steel demand is about evenly divided over the hot and cold rolled. Higher second quarter prices for strip steel are predicted by producers. Common black and light cold rolled sheets also come in for mention as being slated for advances, when second quarter prices are filed, the time for such filing being Feb. 18. Automobile sheet finishing capacity continues to be hard pressed to satisfy customers clamoring for rush shipments.

Within the last four weeks the steel industry's operating rate, according to the American Iron and Steel Institute's figures, has improved to the extent of 37½ per cent, being now at 47½ per cent of theoretical ingot capacity. While it is generally thought that last year's

peak rate of 57.4 per cent, which was attained in June, will be topped in 1935, a slowing down of the pace for a time would not at all upset confidence in the long range trend toward heavier, all around steel consumption.

**Pig Iron**—While the chief support of the Middle West markets continues to come from automotive foundries, there is a routine character to this demand, most of it in single carloads, so that it does not come in for very much comment. Prices are entirely unchanged.

**Aluminum**—Secondary aluminum prices

continue firm. The market for virgin metal is quatably unaltered.

**Copper**—Plans for the holding of a conference of the world's copper producers, previously slated to be held in New York this month, are reported to be up in the air, chiefly because at a meeting of foreign copper interests in London last week it was impossible to reach an agreement. The market situation is unchanged.

**Tin**—Liquidation in London checked the market's advancing tendency. Straits tin being offered for prompt delivery at 50.70 cents at the week's opening.

**Lead**—Quiet and steady.

**Zinc**—While demand is light, sellers maintain their price unchanged at 4.10 cents, New York and 3½ cents, East St. Louis.

## Used Car Trade-in Allowance Clause May Go, NRA Code Price Hearings Indicate

The trend of developments in the code price provisions hearings held in Washington by the National Industrial Recovery Board indicates that the trade-in allowance provision in the dealers' code is slated for the discard. Testimony presented has intimated that violation of this provision has been widespread and has created serious doubt among NRA officials whether enforcement of it is possible. There appears to be a growing complaint from dealers and the buying public in all sections of the country against the retention of this clause. In fact, opposition to it has appeared even within NRA ranks.

Approximately 200 witnesses have appeared at the hearings to present their views on this moot subject of price-fixing, and the general impression is that actual price-fixing, except in real emergencies and in the natural resource industries, should become a thing of the past. Experienced observers are convinced that sales below cost are destined to go, and the future of the "waiting period" clauses is shaky and may be abandoned. It seems certain that open price filing and costing systems are to be retained, however, only after "proper admin-

istration" guards are placed about these provisions, which are interpreted by some to mean increased government supervision.

Considerable doubt is growing in some quarters that the long hearings, held day and night, have induced any drastic change in NRA policy; but by holding the hearings NRA has made good on its promise to make no sweeping changes without giving industry an opportunity to present its views. In this matter of price-fixing this has been done, and the next step is the hearings on labor provisions which are scheduled to start Jan. 30.

In the matter of used car trade-in allowances Frank Latvin, chairman of the National Auto Dealers Code Revision Committee, charged that under the present provision dealers are paying too high a price for trade-in cars on new vehicles. Mr. Latvin's charge also contained the statement there had been no "real enforcement" of this provision and that public sentiment against it has crystallized. Some dealers who have followed this situation closely say that much of the trouble has been caused by small dealers failing to make prompt reports to the code authorities, that the majority of the reports have come from large dealers who are in better position to get higher resale prices for their used cars. Consequently in making up the prices for the Guide Book the higher prices have been used as a basis of figuring and the result is a distorted picture of the true values of used cars.

David B. Spielman, president of Spielman Motor Sales Co. of New York City, whose appeal from the conviction of violating the trade-in allowance provision of the code is pending before the United States Supreme Court, testified before the Board. Mr. Spielman characterized the provisions as a form of direct price-fixing and consequently urged its elimination. He said one of the most serious situations created is that the owner of a car worth more than the allowance set in the Guide Book is penalized and the dealer suffers when he must allow the Guide Book figure on a car worth less than the fixed amount.

The commercial vehicle body industry, according to A. N. Andrews, an executive of the code authority for this industry, is



New FWD 5800 gal. tank, truck-trailer combination designed to meet Kansas size-weight limitations. The length is 50 ft. and the gross weight 62,000 lb. divided as follows: truck, 12,950 lb.; trailer axle assembly, 4800 lb.; fifth wheel, 475 lb.; tank, 7815 lb. and load, 35,960 lb. Axle loads are 7830 lb. front, 13,255 lb. on each rear truck axle, and 14,000 lb. on each trailer axle. Tires are 9.75 x 20 in. all around.

seeking relief from the sales-below-cost activities of some members of the industry. Mr. Andrews said he believed this activity was due to several reasons, chief among them ignorance of costs; desire to take customers away from competitors in an effort to eventually increase prices to compensate for previous losses; to drive out competition, and a desire to keep the firm intact during dull periods. The witness pointed out that the code required records be kept of all sales and a formula for determining costs adopted; nevertheless, he said, many firms had not adopted the formula because it was still in the process of formulation and had not received NRA approval. He said the industry as a whole feels it is losing money and will continue to do so until selling-below-cost provisions are made effective.

Sol Rosenblatt, NRA Compliance and Enforcement Director, explained that an important difficulty in enforcing these selling-below-cost provisions is the securing of proper data. Even after necessary information has been obtained, he said, it is difficult to establish the fact that sales below cost have been made. He added, in explanation, that in the attempt to secure compliance with the trucking code registration of for-hire trucks it was found that fully one-third of such trucks had not secured the necessary license from the registration bureau.

## Recovery May Hinge on Motor Industry—Ayers

### Economist Connects Home, Car Building in Review of Further Probable Gains

Whatever further gains toward recovery are made during 1935 will probably depend largely upon the size of automobile production and the amount of new home building during the next 12 months, according to Col. Leonard P. Ayers, economist and vice-president of the Cleveland Trust Co. Col. Ayers, charting the courses of these two industries since 1919, shows they fairly evenly parallel each other and have reached their peaks and low points practically simultaneously.

The close relation of these two industries to our modern standard of living is pointed out and the fact emphasized that it was the automobile and house building industries that played the most important roles in the recovery from the 1921 slump. Col. Ayers plots the production curve of these two industries, taking 1923-1925 as 100. He shows that while the automobile production curve in

1932 reached about the same low as in 1919, approximately 35 per cent below normal, it then started an immediate upward climb; the house construction business, on the other hand, continued a downward trend to about 10 per cent below and has continued there on a fairly even keel since the middle of 1932.

Col. Ayers points out there is little concern to be felt over the part the automobile industry will play this year in the recovery picture because of the reception given new models by the buying public. However, there is considerable concern felt in the building trade because of the high cost of construction and the fact that rents of existing homes are too low to tempt many families into building.

## L. G. Peed Marries

L. G. Peed, Chrysler vice president, and Miss Anne Hardy, daughter of Mrs. Hazlett Hardy, Muskegon, Mich., were married last week in "The Little Church Around the Corner" (Protestant Episcopal Church of the Transfiguration), New York City. The Rev. Dr. B. A. E. McLaughlin officiated. Immediately after the ceremony the couple left for Palm Springs, Calif., on a wedding trip.

## Jan.-Nov. New Car Dollar Volume Gains 33% Over Corresponding Period of 1933

### U. S. New Car Registrations and Estimated Dollar Volume by Retail Price Classes—November

	UNITS		ESTIMATED DOLLAR VOLUME*		Per Cent of Total			
	1934	1933	Per Cent Change	1934	1933	Per Cent Change	1934	1933
Chevrolet, Ford and Plymouth	73,584	65,381	+ 12.8	68.38	69.46	\$40,600,000	\$36,600,000	+ 11.0
Others under \$750	3,827	17,489	- 78.1	3.56	18.58	2,200,000	11,600,000	- 81.0
\$751-\$1,000	25,571	6,713	+ 280.0	23.76	7.13	18,700,000	5,700,000	+ 228.0
\$1,001-\$1,500	2,602	2,489	+ 4.6	2.42	2.64	3,300,000	2,900,000	+ 13.9
\$1,501-\$2,000	733	577	+ 27.0	.68	.61	1,300,000	900,000	+ 14.5
\$2,001-\$3,000	797	1,255	+ 36.5	.74	1.33	2,000,000	3,200,000	+ 37.5
\$3,001 and over	502	226	+122.0	.46	.25	1,700,000	900,000	+ 88.9
Total	107,616	94,130	+ 14.3	100.00	100.00	\$69,800,000	\$61,800,000	+ 13.0
Miscellaneous	32	50						
Total	107,648	94,180						

### U. S. New Car Registrations and Estimated Dollar Volume by Retail Price Classes—11 Months

	UNITS		ESTIMATED DOLLAR VOLUME*		Per Cent of Total			
	1934	1933	Per Cent Change	1934	1933	Per Cent Change	1934	1933
Chevrolet, Ford and Plymouth	1,316,231	994,754	+ 32.3	72.60	69.37	\$799,600,000	\$548,300,000	+ 46.0
Others Under \$750	77,256	242,390	- 68.1	4.26	16.90	52,200,000	157,900,000	- 66.9
\$751-\$1,000	342,282	109,702	+212.0	18.88	7.65	274,200,000	91,000,000	+ 201.0
\$1,001-\$1,500	50,169	55,982	- 10.4	2.77	3.90	61,600,000	65,100,000	- 5.3
\$1,501-\$2,000	12,874	11,813	+ 9.0	.71	.82	23,400,000	19,500,000	+ 20.0
\$2,001-\$3,000	10,296	14,401	- 28.5	.57	1.00	26,400,000	35,700,000	- 26.0
\$3,001 and over	3,760	5,030	- 25.2	.21	.36	14,400,000	20,400,000	- 29.4
Total	1,812,868	1,434,072	+ 26.2	100.00	100.00	\$1,251,800,000	\$937,900,000	+ 33.7
Miscellaneous	350	1,098						
Total	1,813,218	1,435,170						

\*All calculations are based on list price F.O.B. factory of five passenger, four-door sedan, in conjunction with actual new-car registrations of each model. The total dollar volumes for the different models are then consolidated by price classes.

In calculating estimated dollar volume for November and eleven months, deductions of 10 per cent were made on cars \$1,000 and under, and 15 per cent on all cars over \$1,000, with the exception of Ford, Auburn and Packard, to allow for clean up sales by dealers.

# Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

After a moderate recession during the preceding week, general business resumed its upward trend last week. Gains occurred in the steel automobile, textile and coal industries. Steel operations were the highest for any corresponding period in January in the last five years. A favorable showing in trade was made in practically all sections of the country, although the greatest improvement occurred in those districts where government relief disbursements have been the heaviest.

### Car Loadings Rise

Railway freight loadings during the week ended Jan. 5 totaled 498,073 cars, which marks an increase of 72,953 cars above those during the preceding week, a decline of 2,470 cars below those a year ago, and an increase of 58,604 cars above those two years ago.

### Food Prices Change Little

Retail food prices during the two weeks ended Dec. 18 remained practically unchanged, according to the Bureau of Labor Statistics. The current average is 2.1 per cent below the high point for 1934 reached on Sept. 11 and 11 per cent higher than that on Dec. 19, 1933.

### Department Store Sales

Department store sales during December, according to the Federal Reserve Board, increased by more than

the estimated seasonal amount. The preliminary adjusted index stood at 76, based on the 1923-25 average as 100, as against 73 for November and 74 for October.

### Current Output Increased

Production of electricity by the electric light and power industry in the United States during the week ended Jan. 5 was 6.7 per cent above that in the corresponding period last year.

### Farm Prices Level

The index of farm prices on Dec. 15 was 101, the same as a month earlier. Advances of some of the prices included in the index were cancelled by declines in others. The index of prices paid by farmers for the commodities that they purchase also remained unchanged at 126. This figure, however, is 10 points above that on Dec. 15, 1933.

### Fisher's Index

Professor Fisher's index of wholesale commodity prices for the week ended Jan. 12 stood at 80.7, as against 79.4 the week before and 78.2 two weeks before.

### Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended Jan. 9 showed practically no changes in holdings of discounted bills, of bills bought in the open market, and of government securities.

is a new departure for the government but is imperative if the mother's care method of rearing fatherless families is to become nationally operative. Mr. Roosevelt points out that if the policy of making grants equal to one-half that given by the states and local expenditures (one-third total cost) with special assistance to states temporarily incapacitated, this sum might eventually rise to \$50,000,000 per year. Federal grants in this respect, the President said, should be made conditional upon the passage and enforcement of mandatory state laws and the submission to the Federal government of approved plans assuring minimum standards in investigation.

The members of the Committee on Economic Security signing the report were Miss Frances Perkins, Secretary of Labor; Henry Morgenthau, Jr., Secretary of the Treasury; Homer S. Cummings, Attorney General; Henry A. Wallace, Secretary of Agriculture, and Harry Hopkins, the Federal Emergency Relief Administrator.

## Unions Plan Drive for Power

(Continued from page 65)

that something of a strike nature might be in the wind—as a possibility rather than a probability—is contained in a press release this week from the American Federation of Labor headquarters in Detroit.

In this there is announced that one of the topics being discussed in Chicago this week by William Green, A. F. of L. president, and F. J. Dillon, general automotive organizer, is the "assembling of the National Council of United Automobile Workers for a meeting in the near future to discuss demands which will be submitted to the automobile employers early in February with reference to wage rates, production systems and all phases of employment."

Very largely precipitating this conference is the composite result of employee representation elections in automobile plants being conducted under the supervision of the Automobile Labor Board. In all the elections so far held the A. F. of L. has failed to obtain more than one "designated" representative on the employees bargaining council. The figures also indicate either that A. F. of L. union members in these plants have in large numbers disregarded instructions from Federation headquarters not to participate in the elections, or else that membership must have been much smaller than claimed by A. F. of L.

Under the circumstances the Federation feels, as expressed by one of its Detroit officials—that it is being "elected out of business" as far as the automobile plants are concerned. By the middle of February elections will have been held in all major automobile plants and their subsidiaries in Detroit with the

## Job Insurance Law Asked by President

(Continued from page 65)

ing power in times of economic depression. He recommended that Congress promptly enact legislation which will (1) impose a uniform tax on the employers to whom the act is applicable, beginning in 1936 and (2) creates machinery for the participation in the administration of unemployment compensation. It is presumed he means participation by the United States Government inasmuch as it is proposed that the separate states should make all contributions compulsory from employers alone or from both employers and employees. It is recommended that maximum benefits be \$15 per week and that the maximum benefit period not exceed 15 or 16 weeks. A 3 per cent contribution to the fund based on payrolls is proposed.

In the matter of old age pensions three principal forms are suggested, (1) non-con-

tributory old age pensions, (2) compulsory contributory annuities and (3) voluntary contributory annuities, all of these, whichever type is decided upon, to be applicable at age 65 or over.

Mr. Roosevelt emphasizes the fact that only non-contributory pensions will meet the present situation and recommends that the Federal Government pay one-half the pension, not to exceed \$15 per month for any one person on the Federal government's part. Here also the suggestion is made that the States carry the burden and enact their own old age pension laws. The President stated that laws for these pensions are now in force in more than half the States. Property and income limitations would be fixed by declaring ineligible those persons whose property exceeds \$5,000 in value or whose income is large enough to guarantee a "reasonable subsistence compatible with decency and health."

An initial governmental appropriation of \$25,000,000 per year is asked for the child aid program. It is pointed out that this move

## Wholesale Financing Exceeds Retail by \$44,000,000 in 11 Mos.

(Summary for 282 Identical Organizations)

### RETAIL FINANCING

Year and Month	Wholesale Financing Volume in Dollars	Volume and Average			NEW CARS			USED CARS			UNCLASSIFIED		
		Number of cars	Amount	Per car	Number of cars	Amount	Per car	Number of cars	Amount	Per car	Number of cars	Amount	Per car
Oct., 1934 .....	\$45,363,396	185,414	\$68,224,126	\$368	77,502	\$42,737,846	\$551	103,900	\$24,126,748	\$232	4,012	\$1,359,532	\$339
Nov., 1934 .....	29,762,081	153,312	55,311,834	361	61,798	33,798,299	547	88,246	20,393,172	231	3,268	1,120,363	343
11 Mos., 1934 .....	853,740,387	2,159,454	809,650,663	375	970,188	534,420,260	551	1,145,458	259,701,330	227	43,808	15,529,073	354
Nov., 1933 .....	17,703,226	126,855	43,889,055	346	49,719	26,278,194	529	16,740,762	225	2,678	870,099	325	
11 Mos., 1933 .....	463,411,378	1,610,673	563,329,689	350	696,104	357,918,683	514	878,081	193,827,005	221	36,488	11,584,001	317

exception of Ford (over which the Labor Board has no official jurisdiction), Graham, Hupmobile, and Lincoln.

Covered through elections by the middle of February therefore, will be somewhat better than 30 per cent of all workers coming under the ALB jurisdiction, including virtually all workers for the Chrysler Corporation, Packard, Hudson, and the Detroit plants of General Motors.

Untouched at that time probably will be the "danger spots" of the automotive industry, Cleveland and Flint, since, apparently no elections are being conducted out of town until Detroit has been covered.

That the A. F. of L. will hold its joint council meeting seems almost a foregone conclusion unless the Federation is willing at this time to abandon further attempts at large-scale unionization of the automotive industry. That it will then present "demands" to automobile companies and automotive parts companies also seems fairly certain.

Those two steps will provide the necessary "scenery" for whatever further action the Federation may decide upon. At this time it does not appear likely that the Federation will attempt a general strike. As a matter of fact it seems hardly likely that such a strike could be maintained long enough to secure government intervention, and if the latter were secured it is scarcely probable that it would be favorable to the Federation.

It seems far more likely that the Federation might focus any actual strike activities on one or two localities or two or three "key" plants—a situation much easier to control long enough to secure "governmental intervention."

Reasons for a desire for government intervention in the automotive labor situation at this time would be that the Federation wants to have the President's agreement abrogated, Dr. Wolman's automotive labor board disbanded, and the employee representation elections voided. The Federation has rather definitely committed itself to every one of these three points, as follows:

1. The Detroit council of AFL has demanded abrogation of the agreement by William Green.

2. It is carrying on a continuous attack on the ALB in general and on its own representative Richard Byrd, in particular, whom the AFL has officially repudiated a number of times.

3. The Federation has definitely stated that it would not participate in the ALB employee elections and would not be bound thereby.

Both the second and third factors were re-

iterated this week in a letter from Mr. Dillon to Dr. Leo Wolman.

The most recent development in the elections was the primary held Wednesday in the Dodge truck plant. The result was a repetition of results elsewhere. The men elected representatives as individuals rather than as members of organizations. Out of 2391 eligible voters, and with 2350 of these at the time employed in the plant, 2228 ballots were cast. Either the AFL members voted or else their membership in the plant must have been rather limited. Only 166 ballots indicated desire for affiliation with AFL of representatives elected; 1993 voted for "unaffiliated" candidates. There were even fewer, 15 votes, in favor of the Chrysler Employees Representative Association, and two votes for both the MESA and the Auto Workers Union; 50 ballots were either voided or blank.

Thus, of the eight or nine men finally to be placed on the board following the final election, only one will be "affiliated" with A. F. of L. and none with the other organizations.

### Bailey, Beasley Reelected Pontiac Die Tool Officers

No change was made in the official personnel of the Pontiac Die Tool and Machine Co. of Detroit at the recent annual election. H. B. Bailey was reelected president and Theodore Beasley, secretary and treasurer.

### SAE Annual Meeting

(Continued from page 65)

revealed the details of the work the Army has been doing on fuel injection and stated that it was planned tentatively to require all Army engines bought after July first for single engined airplanes to be fitted with fuel injection systems instead of carburetors.

Two sessions on Diesels were held today. In his report on the work of the Volunteer Committee on Compression Ignition Fuel Research, T. B. Rendel, of Shell, said that they were ready now to proceed with a study of ignition quality leading ultimately to correlation tests on the road. A session on passenger car suspensions, and two on aircraft were other feature events today.

At the evening session devoted to air transport there was evidenced considerable demand on the part of operators for availability of new airplanes and power plants capable of high speed high altitude flying. Also reiterated several times was the demand heard in previous years for aircraft power plants developing better than 1000 horsepower.

### W. C. MacFarlane Traveling

W. C. MacFarlane, president of Minneapolis-Moline Power Implement Co., Minneapolis, Minn., has left on a trade expansion trip of 20,000 miles, visiting all countries except Paraguay and Bolivia.

## CALENDAR OF COMING EVENTS

### SHOWS

Springfield, Ill., Automotive Show,	Jan. 13-20	Omaha Automobile Show.....	Feb. 3-9
National Motor Boat Show, New York .....	Jan. 18-26	Wilmington, Del., Automobile Show,	Feb. 3-9
Toledo Automobile Show.....	Jan. 18-24	Kansas City, Mo. Automobile Show	Feb. 9-16
Columbus, Ohio Automobile Show	Jan. 19-24	Denver, Colo. Automobile Show..	Feb. 10-23
San Francisco Automobile Show, Jan. 19-26	Jan. 19-26	Peoria, Ill., Automobile Show....	Feb. 13-17
Boston Automobile Dealers Assoc.—Automobile Show .....	Jan. 19-26	Bethlehem, Pa., Automobile Show.	Feb. 18-23
Pittsburgh, Pa. Automobile Show,	Jan. 19-26	Evansville, Ind. Automobile Show..	Feb. 23-27
Hartford, Conn. Automobile Show.Jan. 19-26	Jan. 19-26	Minneapolis Automobile Show....	Mar. 9-16
Syracuse Automobile Show .....	Jan. 19-26	Mankato, Minn. Automobile Show	Mar. 16-23
Nashville, Tenn., Automobile Show	Jan. 20-26		
Baltimore—Automobile Show ...Jan. 21-26	Jan. 21-26		
Rochester Automobile Show.....Jan. 21-26	Jan. 21-26		
Lansing Automobile Show.....Jan. 22-27	Jan. 22-27		
Chicago Automobile Show...Jan. 26-Feb. 2	Jan. 26-Feb. 2		
Montreal, Que., Automobile Show	Jan. 26-Feb. 2		
Springfield, Mass. Automobile Show,	Jan. 28-Feb. 2		
Lancaster Automobile Show.Jan. 29-Feb. 2	Jan. 29-Feb. 2		
Harrisburg Automobile Show.Jan. 30-Feb. 2	Jan. 30-Feb. 2		

### ANNUAL MEETINGS

American Roadbuilders Assoc., Wash- ington, D. C. ....	Jan. 22-25
Automotive Parts & Equipment Mfrs., Inc.—Chicago .....	Jan. 29

### CONVENTIONS

Lafayette, Ind. (Purdue University), Automotive Service Conference,	
	Mar. 21-22



M. T. Rodgers

LIKE many other men in similar positions, I have been closely associated with the development of the code for our industry. Our company felt that it was our duty to do everything possible and our executives devoted many hours of conscientious work in an effort to do our bit toward supporting the President in his drive for industrial recovery.

From the first it seemed to me that we tried to move too fast—that none of us had sufficient experience with such matters or enough definite knowledge of what was or was not permitted to enable us to arrive at proper decisions—that the government men with whom we had to work were similarly handicapped. What we finally developed after months of effort was torn apart by various boards at Washington and the code ultimately presented to us as being acceptable was entirely different from what we had offered and hoped to obtain.

It is perfectly natural, then, that we have been disappointed and that our interest in the code has waned. We recognize it as a law under which we must operate, but we do not respect it as a set of constructive regulations for our industry. Possibly labor has profited under our code and to that extent it has helped, but certainly the distribution problems are more muddled than ever and competitors are much more suspicious of each other.

I am sure that the experience we have had is not very different from what other small industries have seen develop. And I contend that if the majority of business men in the country do not respect the laws that have been laid down, they will find some ways of evading them. Probably the greatest example of this is the attitude shown by countless leading citizens toward a law which they felt restricted their liberties—the Prohibition Law. The experience is too recent and too vivid to forget quickly—it is possible that policing the codes will be as expensive as was the effort to prevent the use of liquor, and unless great care is taken

it will be abused in a similar manner.

As I look back over the experiences of the last 18 months, I believe that it would have been much wiser had the President and his advisers picked out a few key industries and persuaded, rather than ordered, them to set up codes under which they would have been glad to operate. It is probable that if he had done this, those industries would have supplied their leading executives to work out the problems and the government could have picked a few outstanding men to work with them rather than such an army of deputies, some enthusiastic but theoretical college graduates, some regular job-hunters, and only a few practical business men with a real knowledge of the problems.

If this had been done and the codes had worked out successfully for these few industries, they could have been extended and the leaders of the smaller companies would have voluntarily set up rules for their own industries modeled after the fundamental codes for the larger units. Under such conditions there would have been the respect for the laws which I consider so important for their successful enforcement.

Possibly it isn't too late even now. Perhaps it is the Administration's purpose in the reorganization of the NRA to take the mass of codes that have been developed, boil them down and try to establish fundamental rules which we shall respect and principles which we shall recognize as sound. If this is done the NRA may still be considered successful, but under present conditions it

## Energetic New Ideas

# Business Leadership Plus Will Retrieve Prosperity

by M. T. Rodgers

Vice President, Multibestos Co., and President of  
the Motor & Equipment Manufacturers Ass'n.

doesn't seem to me that it is functioning properly or that it is really helping recovery in the majority of cases.

There are two laws that have survived the ages: Newton's Law of Gravitation and the Law of Supply and Demand. The Administration has not tampered with the first and has not yet proved that it can change the second. Depression conditions have forced down the normal demand for merchandise, not because people wanted less, but because they could not buy what they wanted and, in many cases, actually needed. During this period the large surpluses have been gradually disappearing, with the result that today supply is in much better balance with demand. I am sure that people need more right now because one cannot continue to live indefinitely on 30 to 40 per cent less than normal requirements, and I am equally sure that they want more. If they can find just a little encouragement to feel that they can soon earn what they really want they will take a chance, and while I should dislike to see the return of the extensive installment buying prevalent before 1929, a reasonable extension of credit is possible for the purchase of those things that people want and will make sacrifices to get.

If there is this latent demand, what we need is a group of cour-

ageous leaders who will recognize it and say, "Now is the time to build up for this demand which we know is bound to come." If a few begin to do this their neighbors will do likewise and the news will spread. Henry Ford has already announced that he will build one million cars this year. That announcement was given wide publicity and the attitude at Detroit, for example, changed almost over night. If a few other outstanding industrialists will do likewise they will put a lot of people to work who will buy more merchandise and the snowball will begin to roll up. And all of this will increase that feeling of confidence which is so necessary.

We have heard much about this lack of confidence in the future and how it is affecting business. Many industrialists have asked—even demanded—that the President make some statements that will instill confidence in business.

After all, the government is a great big business organization—the biggest that we have in the country. If in other business organizations the subordinates always waited for word from the leader, that leader's effectiveness would very soon be impaired. It is up to the men in the ranks to work out new ideas, to the production men to find new methods of building at lower costs, to the sales department to develop new

plans for merchandising, and then submit their ideas to the chief who passes on them.

I look to the business men of the country as the real leaders rather than to the politicians. The business men are the people who have to meet the payrolls, who encourage worthy men and women in their employ to greater accomplishments and who, therefore, make possible higher standards of living. I believe that we will work out of the depression as the *real* leaders of the country accept their responsibilities and go ahead with plans to create more business based, not on the support given by the politicians, but, if necessary, in spite of them. Let's depend on that law of supply and demand that has endured all these years. Let's recognize that people need and want more. Let's study those wants and see to it that our products answer the requirements and then plan our sales efforts in such a way that we can help people buy what we make with reasonable extensions of credit where it is due.

# Slip Angle, Camber, Load, Speed, Pressure, Rim Width, Size—

engineer were discussed in a paper by R. D. Evans of the Goodyear Tire & Rubber Co. It is always one of the major problems of the tire engineer to discover how more cushioning may be "bought" at the least expenditure of cornering "coin." Related to this problem is that of durability. This latter term may refer to tread wear, to carcass deterioration, to bead disintegration or to other "diseases," according to the nature of the service, but just as cornering and cushioning are antagonistic qualities, so durability is generally reduced by factors which tend to improve either the cornering power or the cushioning effect.

There are evidently three sets of

load or lateral thrust. It is the property of the tire which permits steering around a curved path at speed, and conversely it is that property which holds the car in a substantially straight path when acted on by incidental lateral forces such as wind.

Cornering force or thrust appears when the tire is caused to roll in such a manner that its plane of rotation makes an angle with the path of advance. This angle, sometimes spoken of as toe-in, is more appropriately called *slip angle*. The relation between cornering force and slip angle for a particular size and type of tire under the indicated conditions is shown in Fig. 1. The *slope* of the straight part

## How They Affect the Tire

**B**ESIDES their well-known functions of smoothing the ride, lessening noise, and providing the necessary adherence for quick acceleration and retardation, pneumatic tires must give directive control or must have what is known as "cornering power." Unfortunately, high cornering power is incompatible with high cushioning power. For instance, it is well known that the cushioning effect of a tire can be improved by decreasing the inflation pressure, but this reduction in inflation pressure correspondingly reduces the cornering power, and a pressure is soon reached at which the steering and handling of the car becomes unsatisfactory.

Problems with which the trends toward lower inflation pressures and higher speeds have confronted the tire

forces active at the contact surface between tire and road, viz.:

1. The force perpendicular to the contact area, due to the weight of the car and to road shocks. This is referred to as the vertical force or the radial load on the tire.

2. The force in the plane of the contact area and parallel to the direction

Fig. 2

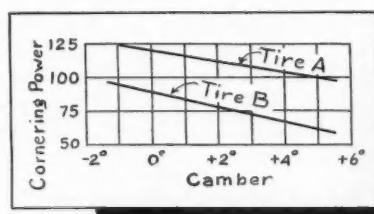
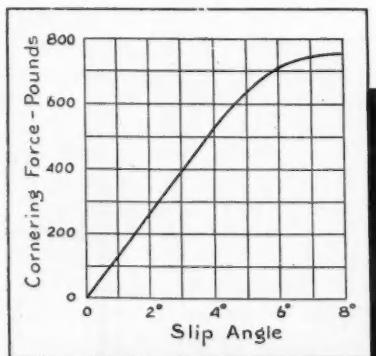


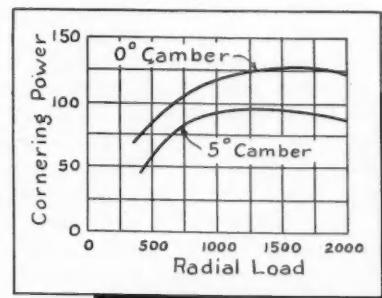
Fig. 1



Tire size ..... 7.50-17 6 ply  
Load ..... 1500 lbs.  
Inflation ..... 30 lbs. per sq. in.  
Camber ..... 0°

January 19, 1935

Fig. 3



Tire size ..... 7.50-17 6 ply  
Inflation ..... 30 lbs. per sq. in.

of this line, that is, the cornering force per degree of slip angle, may be called the cornering power of this particular tire. The value of cornering power in this particular case is 125 lb. per deg.

The initial slope of the curve is practically independent of the texture of the road surface, if it is hard and dry and reasonably smooth. The value of the slip angle at which "tapering off" begins does depend to some extent on the road texture, for this lateral force must depend ultimately on the basic coefficient of friction between tire tread and road. In any case, the cornering force appears to have reached its maximum for a slip angle of 9 or 10 deg.

When a car travels in a curved path the several wheels have more or less camber, and it is of primary importance to see how camber affects cornering power. Fig. 2 illustrates this effect. Camber is called positive when, in taking a curve, the top of the tire leans away from the center of the curved path. The camber effect may

of motion, which is due to tractive and braking forces.

3. The force in the plane of the contact area and at right angles to the direction of motion. This is the lateral or cornering force.

In the tire-testing laboratory of the Goodyear Tire & Rubber Co. a special machine has been installed whereby the several forces may be accurately measured under any conditions of speed, camber and orientation. Numerous sizes and types of tire have been investigated under various conditions of load, inflation and rim mountings. The experimental data presented in the paper were obtained with this equipment.

Cornering power may be defined as the ability of a tire to develop side



be thought of as a sort of push of the "foot" of the tire sidewise against the roadway, when the tire leans over. This push is added to or subtracted from the thrust due to slip angle, depending on whether the tire leans "into the curve," as in a bicycle, or outward with respect to the curve, as in most of the 1934 cars with independent front springing.

This camber "push" depends not only on the angle of camber but also to some extent on the tire construction. Tire B in Fig. 2 not only has less cornering power than A at 0 deg. camber (approximately 72 per cent as much) but the change due to camber is greater. Thus, for each degree of

posing or balancing the centrifugal effect. The centrifugal effect is, of course, proportional to the axle load. Hence we should really consider the magnitude of the cornering force in relation to the radial load on the tire; this idea leads at once to the conception of a "cornering coefficient," which may be defined as the cornering power per unit of radial load. The data of Fig. 3 are replotted on this basis in Fig. 4. There is now no maximum point; the principal lesson to learn here is that the more load a tire carries, the less effective it is as a mechanism for pushing that load around a curved path.

Cornering power changes only slight-

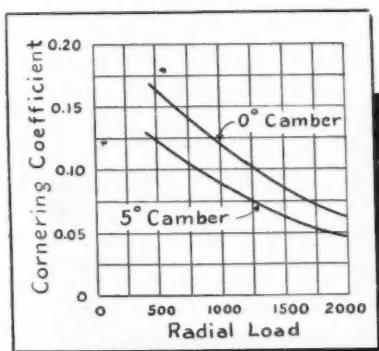
Cornering power improves as the rim width increases, but the improvement "tapers off" as the rim approaches the width of the tire itself. The question immediately presents itself: "Is not increasing the rim width a good way to get more cornering power, and what are the disadvantages of so doing?" The answer is that within certain limits it is an excellent way. The disadvantages are that the ride is made harder and that the durability of the tire is seriously impaired.

As regards the effect of tire size on cornering power, consider a 5.25-17 4-ply and a 7.50-17 6-ply heavy-duty tire, which have Tire-and-Rim-Association load ratings of 885 lb. at 32 lb. inflation and 1645 lb. at 36 lb. inflation respectively. At these loads and inflations, and on their respective recommended rims, the cornering powers of these two tires are 102 and 138 respectively. The cornering coefficients, as previously defined, are therefore 0.115 for the smaller tire and 0.085 for the larger. Obviously, the smaller tire can take care of the cornering work it has to do much better. This is an important reason why steering and handling at high speed are more of a problem on large than on small cars.

A moderate change in cord angle can profoundly affect many of the performance characteristics of the tire. A 10 deg. increase in cord angle—that is, laying the cord more nearly crosswise of the tire—gives a very intriguing improvement in cushioning, but the price which has to be paid in cornering and in durability is impossibly high.

# "Cornering" Power

Fig. 4



Tire size ..... 7.50-17 6 ply  
Inflation ..... 30 lbs.

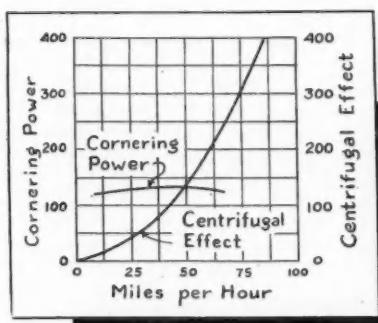
positive camber, B loses 5.6 per cent of its cornering power, whereas A loses only 4.2 per cent. There is no known tire construction in which the camber effect is appreciably less than in tire A.

Fig. 3 shows how the cornering power varies with the radial load on the tire. Between 50 per cent and 200 per cent of the normal load rating of the tire, the cornering power does not change greatly, although the cornering power usually passes through a maximum value in the general region of the rated load. This maximum is more sharply indicated when the tire is positively cambered. There is no special benefit in this maximum value, however, as will appear from the following reasoning:

Cornering power is useful in that it provides a lateral thrust which keeps pushing the car around the curve, op-

ly with speed, as shown in Fig. 5. This fact has a very important implication. The centrifugal effect on curves increases as the square of the speed, whereas the cornering power, with which we oppose or balance the centrifugal effect, does not increase appreciably with the speed. This is the reason why cornering problems are much more difficult of solution when the speed is high. This effect is illustrated in Fig. 5, in which an arbi-

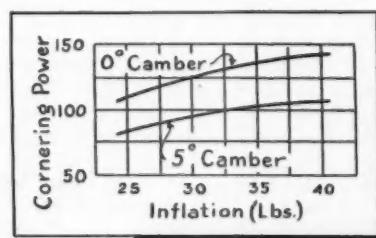
Fig. 5



trary "centrifugal effect" is plotted against speed in the dotted line.

Cornering power depends also on the inflation pressure, and for a wide variety of sizes and types of tire and within the inflation-pressure range of 25-35 lb. per sq. in., the C. P. increases between 2 and 2.5 lb. for each pound increase in inflation pressure. At higher inflation pressures the effect tapers off (Fig. 6).

Fig. 6



Tire size ..... 7.50-17 6 ply  
Load ..... 1500 lbs.  
Rim ..... 4.19 F

# A New Method of Analyzing

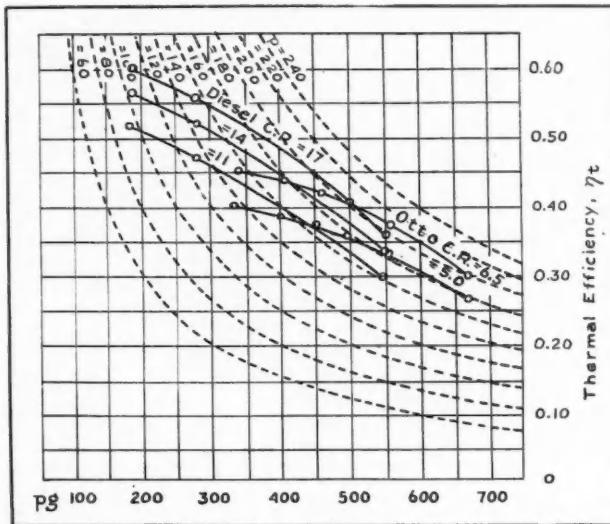


Fig. 1 — Efficiencies of ideal cycles, Diesel and Otto

then define a fictitious pressure by the relation

$$pg = \frac{pi}{\eta_t}$$

where  $pg$  is the "fuel mean pressure" in lb. per sq. in. and  $\eta_t$  the thermal efficiency of the cycle.

This pressure, like  $pi$ , has the dimensions work/volume, that is,  $pg$  is a measure of the *usable heat supplied per unit volume*. It may, therefore, also be defined in terms of  $X$ , as follows:

$$pg = \frac{w \times X Hu \times 778 \times 12}{w_0 V} \quad (1)$$

where

$w$  = weight or air present

$w_0$  = weight of air theoretically required to burn 1 pound of fuel

A NEW method of analyzing engine diagrams was described in a paper by E. S. Dennison of the Westinghouse E. & M Co., entitled "A Rational Basis for Comparing Diesel Performances." By this method the thermal efficiency (which is readily determined from the specific fuel consumption and the heat value of the fuel) is plotted against the quotient of the indicated mean effective pressure by the product of the thermal efficiency and the air density. These plots are said to be very convenient for analyzing test results. The effect of any modification which may influence the efficiency, whether it be in the air-induction system, the pressure cycle, or the combustion process, is faithfully represented. Aside from its convenience for this purpose, the diagram is useful as a characteristic by means of which engines of various kinds can be logically compared.

Discussions of ideal engine cycles show that their efficiencies are a function of the air/fuel ratio as well as of the compression ratio. The former is usually expressed in terms of the variable

$$\lambda = \frac{\text{weight of air available}}{\text{weight required for combustion}}$$

At light loads  $\lambda$  is very large and theoretically it may vary between one and infinity. This makes it awkward to use, especially where graphical methods are to be employed, and for that reason the reciprocal,  $X = 1/\lambda$ , is generally worked with. Then  $X$  denotes

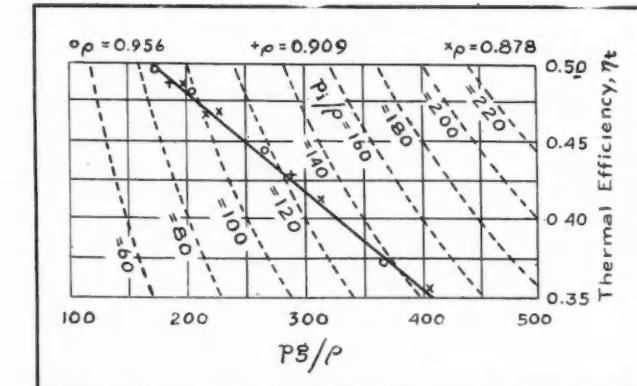


Fig. 2 — Variable suction temperature. Four-cylinder, 9-in. bore, 12-in. stroke, 900 r.p.m. Temperature variation, 90 deg. to 140 deg. Fahr.

the air used in combustion as a fraction of the total air present. Its normal range of variation is 0 to 1. In any given instance its value is proportional to the fuel injected (or heat added) per cycle. Curves of ideal efficiency plotted against  $X$  are nearly linear, instead of asymptotic, and are more satisfactory from the standpoint of interpolation.

An ideal cycle is characterized not only by its efficiency but by its indicated mean pressure. The latter is a measure of useful work done per cycle per unit volume swept by the piston. The dimensional relation is

$$\text{Work/Volume} = FL/L^2 = F/L^2 = pi \quad (\text{lb. per sq. in.})$$

in which  $pi$  is the indicated mean pressure, and  $F$  and  $L$  denote force and length respectively. Having a certain thermal efficiency and mean pressure corresponding to a given cycle, we may

$Hu$  = lower heating value of the fuel, BTU per lb.

$V$  = swept volume, cu. in.

In a given ideal cycle, each of the factors of equation (1) is a constant, hence

$$pg = \text{Constant} \times X.$$

Therefore,  $\eta_t$  may be plotted against  $pg$  as well as against  $X$  or  $\lambda$ .

Fig. 1 shows the result of this rearrangement for a number of cycles, both Diesel and Otto. The abscissa corresponds to the specific supply of heat; the ordinate expresses the efficiency with which that supply is converted to mechanical work. Hyperbolic curves of constant i.m.p. are determined by the equation  $pi = \eta_t \cdot pg$  and may be added to the diagram. The maximum i.m.p. for each case, and the efficiency with which it can be developed are apparent on inspection. While the origi-

# Indicator Cards

nal cycle calculations were based on specified fuels, the resulting diagram applies with slight error to other liquid fuels as well. Diesel and Otto cycles are therefore compared on the basis of their relative capacities for converting a given supply of heat into useful work.

The actual engine cycle can be expressed in exactly the same terms as the ideal cycles. In this case the actual specific supply of heat,  $pg$ , is the abscissa, and indicated thermal efficiency the ordinate. The required data include  $pi$ ,  $g$  (weight of fuel injected per cycle) and  $Hu$  for the fuel employed. Only the lower heating value of the fuel is of interest, since we are concerned with the *usable* heat supplied per unit displacement volume. The latter can be calculated directly by means of the equation

$$pg = \frac{g \times Hu \times 778 \times 12}{V}$$

lb. per sq. in. (2)

where  $V$  is piston displacement in cu. in. Thus any test results can be easily transposed to this basis, with several advantages. The points tend to fall on straight or slightly curved lines, facilitating plotting and interpolation, while discrepancies stand out. Supposing the characteristic curve of an ideal cycle to be plotted on the same sheet, the "cylinder efficiency" of the engine may be found by direct comparison. This efficiency is, of course, the ratio of ordinates for the actual and ideal cycles respectively at a given abscissa. It represents the relative effectiveness of the two cycles in converting a given heat input, per unit volume, to useful work. The actual cylinder is penalized, in effect, on volumetric efficiency as well as on losses in the combustion process.

But the representation of a test may be misleading if atmospheric conditions are not taken into account, and a

suitable adjustment must be made. Referring again to ideal cycles, it is possible to show that all variations due to suction-air conditions are explainable in terms of density, rather than in terms of pressure and temperature separately. That is, the thermal efficiency is determined by  $X$ , irrespective of density, while the mean pressure  $pi$  at a given  $X$  is directly proportional to suction-air density. These statements hold strictly for pressure changes, and with good approximation for temperature changes also.

To allow for the effect of air density, we note that

$$w = V \times \eta_v$$

where  $\rho$  is the air density and  $\eta_v$  the volumetric efficiency.

Substituting in equation (1) and simplifying

$$pg = \frac{X \times \eta_v \times \rho \times Hu \times 778 \times 12}{W_o} \quad (3)$$

or

$$\frac{pg}{\rho} = \text{Constant} \times X \times \eta_v$$

Now  $\eta_v$  is not a constant but varies with load. Certain tests have tended to show that  $\eta_v$  is in fact a function of  $X$ . Then

$$pg / \rho = f(X)$$

Hence any property of a cycle—ideal or actual—which can be related to  $X$  can be related to  $pg/\rho$  as well.

This proposition lends itself to confirmation by a check against engine tests. Thus we should expect to find that  $\eta_v$  is a function of  $pg/\rho$ , irrespective of air density. Examples of such tests are shown by Figs. 2 and 3. Air density is expressed for convenience in terms of normal atmospheric density (0.075 lb. per cu. ft. at 14.7 lb. per sq. in. and 70 deg. F.).



Fig. 2 represents a series of runs of a four-cycle engine in which suction pressure was atmospheric throughout while suction temperature was varied by artificial heating, from 90 to 140 deg. F. The variation of density is from 0.956 to 0.878.

Fig. 3 represents runs of the same engine, assembled with somewhat different elements, and supercharged. The supply pressure varied from 4 to 12 in. of mercury, and the temperature from 92 to 134 deg. F. The variation of density is 1.086 to 1.250. In this series the compression ratio was constant; likewise the ratio of the maximum cycle pressure to absolute suction pressure was maintained constant. These conditions place the ideal cycles on a basis of equality. In each test, in arriving at the indicated mean pressure, the motoring torque of the hot engine at equal suction pressure was accepted as equivalent to friction torque.

An inspection of these two figures will show that the scattering of points has little relation to suction-air density, and the adjustment may be considered accurate within ordinary limits of experimental error. For the present purpose this means that we are justified in using this method for reducing engine performances to standard atmospheric conditions. Incidentally, the results illustrate the linear tendency of the relationship. It will be noticed that the hyperbolic curves now represent constant values of  $pi/\rho$ .

## Synthesizing the Pressure Time Curve

THE subject of Flame Movement and Pressure Development in Gasoline Engines was discussed in a paper by Clarke C. Minter, consulting chemist. The paper was largely in the form of comment on the work of Ricardo, Whatmough and Janeway on combustion phenomena. A method is described by means of which a pressure-time curve of an engine can be synthesized from the shape of the compression space. Piston motion during the time that combustion proceeds is not taken into account, and it is pointed out that studies of this nature would yield more valuable results if the piston movement were considered.

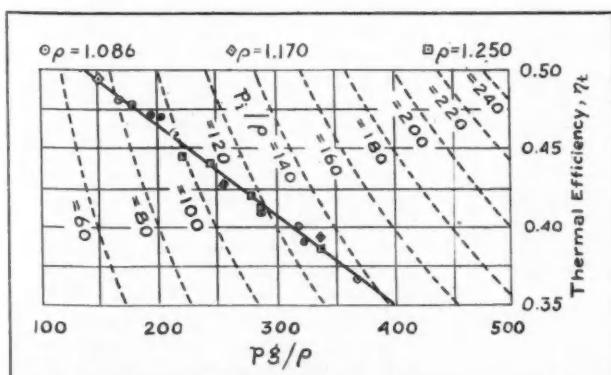


Fig. 3—Variable supercharge pressure. Same as Fig. 2. Pressure variation, 4 in. to 12 in. mercury

# Wind Tunnel Tests

## Show Reduction in with Rear-Engine,

ELLIOTT G. REID of the Guggenheim Aeronautical Laboratory, Stanford University, presented a paper dealing with some research work on the streamlining of automobile bodies carried out at that institution. Wind tunnel tests were made on four models of streamlined cars. The work of designing, building and testing these models constituted the thesis investigation of two graduate students in mechanical engineering.

It is apparent, the author states, that if aerodynamic refinement of motor cars is to have practical value under present conditions, it must be effected without increasing current overall dimensions. According to a fundamental aerodynamic principle, for a given maximum transverse profile and length the air resistance is a minimum if the largest cross-section is located slightly forward of mid-length and the after portion is gently tapered to a point or edge; that is, when the taper of the rear portion is less abrupt than that of the front portion. In the passenger automobile this requirement can be satisfied only if the passenger compartment (largest transverse profile) is located nearer the front, which directly points to the rear-engined design.

Although a number of experimental rear-engined cars have been built, all appear to have had serious faults. Most common among these was excessive overall length. In most cases, moreover, the center of gravity was too far to the rear. In the example of greatest aerodynamic refinement, the rear engine was combined with a front drive, which

sacrificed the potential advantage of the low passenger compartment which is possible with a drive to the near axle.

A consideration of these and other objections led to the question: "Why not use forward steering and rear drive in combination with a rear-mounting engine, move the passenger compartment forward and enclose the rearranged volumes with a streamlined body?"

Models of cars designed along these lines were made to a scale of 1/5. They represented for the most part sedans of 125-in. wheelbase and 56-in. tread. One of the models is represented by the drawing in Fig. 1.

In the paper the power requirements of the full-scale car corresponding to the design Fig. 1 were compared with those of a compromise design due to Professor Lay and of a conventional sedan. All are assumed to have the same weight and, therefore, the same rolling resistance. Rolling resistances were calculated on the basis of 11.6 lb. per 1000. The frontal areas and air resistance coefficients used in the calculations of air resistance are tabulated below.

Front Area S Sq. Ft.	K	K <sub>S</sub>
Front engine, conventional .....	28	0.00155
Front engine, compromise (Lay) .....	30	0.0008
Rear engine, Model B' .....	22	0.00042

The value of S used for the conventional type is an average of actual measurements of a number of current 5-passenger sedans of approximately 125 in. wheelbase. Lay's compromise model would have a slightly greater frontal area than that of the conventional car because the upper part of the body would be wider. The full scale frontal area of Fig. 1 was determined

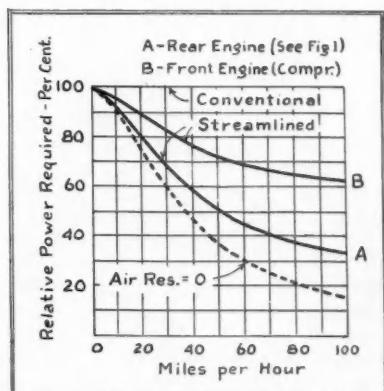


Fig. 2—Power requirements of conventional and streamlined sedans

by planimetry of the model drawing. Its low value is explained by the fact that, with no shaft or transmission beneath it, the passenger compartment of the rear-engine, rear-drive car can be slung as low as it has been in the case of the front-engine, front-drive combination. The average width is also somewhat less than is now conventional, as a consequence of the amid-ship position of the rear seat, the narrow tread (56 in.) and the generous rounding of the roof.

The third column of the table contains values which are directly proportional to the air resistances of the three cars for equal speeds. It will be seen that the air resistance of the conventional car can be reduced by approximately 45 and 79 per cent by the use of streamlined bodies with the front- and rear-engine chassis, respectively. The reductions of total resistance are, naturally, of a smaller order because the rolling resistance is assumed to be un-

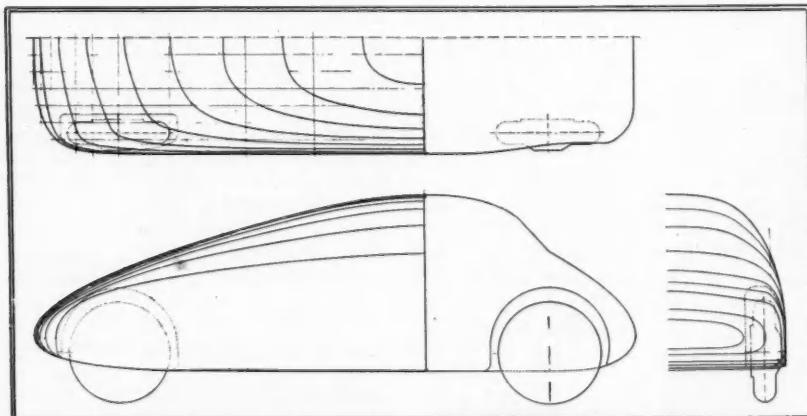


Fig. 1—One of the models subjected to wind tunnel tests

# Resistance Obtainable Streamlined Model



W. R. GRISWOLD

Chairman of the 'Passenger Car Suspension Symposium at which Elliott G. Reid presented his paper

changed. The total power requirements of the three cars are illustrated by Fig. 2.

The author admits that the project of turning the present-day car end for end entails a formidable list of design problems which are not to be dismissed with a wave of the hand. Difficulties of an aerodynamic character, such as that of cooling without a nose radiator, ventilation of the passenger compartment, elimination of fumes from the engine, etc., probably can be overcome without a great deal of trouble. An adequate V-type engine and its accessories can be housed within the space provided in the proposed arrangement, and it seems reasonable to anticipate considerable simplification of the power transmission system. The question of access to the front seat can certainly be answered satisfactorily.

As a premium for the solution of these problems, an imposing list of attractive features will be found in a



Annual Meeting

car of the proposed type. The improvements of economy and performance come first, and are, probably, of the greatest importance. However, the better and more uniform riding qualities promised by the placing of the variable load close to the center of gravity deserve more than casual mention. The lowering of the center of gravity is likewise desirable and the reduction of the moment of inertia about the vertical centroidal axis should lead to improved handling qualities. Last, but not necessarily least, passenger comfort will surely benefit by the elimination of noise and heat from the engine compartment and the reduction of wind noise which is sure to accompany the smoothing of external contours.

## Aircraft and Engines for Private and Transport Service

"OPERATING Requirements of Transport Airplanes" was the title of a paper by William Littlewood, chief engineer of American Airlines, Inc. Mr. Littlewood discussed the modern transport plane from the viewpoints of speed, safety, reliability and economy. With regard to possible future developments he had the following to say:

"The type of future transport airplanes seems to be fairly well established by the present trend toward low-wing, all-metal monoplanes. It is believed that this type is very suitable, the only operating objection being restricted passenger vision, which can be largely overcome by elevation of seats and windows, and which becomes of decreasing importance as altitudes of operation are increased. Future airplanes of this type will, it is felt, be powered by one, two or four engines, of sizes as required by the loads and desired performance. It has been, and will be, true that airplanes are built to fit engines already available, and it is essential that at least 1000-hp. units

of proven reliability be ready before these hopes for future transport equipment can be realized."



OPIE CHENOWETH  
Chairman of the Tuesday afternoon Aircraft Engine session

THE designers' and manufacturers' viewpoint on the requirements of aircraft intended for airline operation was given in a paper prepared by J. H. Kindelberger of the General Aviation Manufacturing Corporation and in a supplementary discussion by J. L. Atwood of the same firm. Mr. Kindelberger said it was essential that an operator contemplating the purchase of new equipment should be prepared to specify all of the requirements as to performance, passenger comfort, arrangement and equipment dictated by his needs. It must also be borne in mind that such new equipment must be predicated upon the needs of the times two years in advance, as the average transport airplane requires a year for the production of the experimental model and a year additional for testing and preparing for quantity production.

Mr. Atwood said the last ten years had seen a remarkable increase in airplane speeds in all classes; in some cases the maximum speeds of a decade ago had been actually doubled. This was

truly remarkable in itself when it was considered that to double the speed of an airplane required that the power be multiplied by eight or that the drag be divided by eight, or that an equivalent combination of both be effected. In many cases, particularly racing planes, power had been added as fast as engine designers could produce it. It was actually a more important achievement, however, that modern transport planes, in which economy was always important, should be capable of an operating speed of over 200 m.p.h.

such facts, the officials of the Bureau of Air Commerce would be derelict in their duty and would be neglecting their greatest opportunity to further the private use of aircraft if they were to take no corrective measures. They had the choice between the issuance of regulations which would compel all manufacturers to discontinue their present types and develop new models having the safety features which could now be incorporated in all aircraft, and sponsoring the development of such an airplane to demonstrate its possibilities and lead the industry to make the necessary changes of its own accord. Strong

**J**OHN H. GEISSE, chief of the Aeronautics Development Section, Bureau of Air Commerce, Department of Commerce, discussed "Air Transportation Equipment for the Private Owner" along the lines of his talk at the recent meeting of the Philadelphia Section. Mr. Geisse said there seemed to be a tendency on the part of many in the industry to believe that purchasers buy airplanes only to learn how to fly present types of equipment and that the small airplane should first of all be suitable as a trainer. They apparently could not conceive of anyone purchasing an airplane, which he intended to fly himself, for any other reason than learning how to fly. Although it was perfectly true that there were individuals who purchased airplanes for this purpose and that practically all sales in the past had been to this type of purchaser, it must be recognized that the volume of this business could never be great and was inclined to be unprofitable.

A compilation of the causes of flying accidents in regular scheduled services and in non-scheduled flying left no room for doubt that safety in flying was not so much a question of the safety of flying equipment as of the skill of the pilot. Mr. Geisse said that, faced with



**F. S. SPRING**  
Who delivered a paper at the  
Privately-Owned-Airplane ses-  
sion

representations for the former course were presented to the Bureau, and it was quite likely that such regulations would have to be made eventually. The alternate course, certainly much more favorable to the present manufacturers, was chosen and every effort would be made to follow it to a successful conclusion.

**T**HE average present-day private airplane operator, as pictured by Frank S. Spring of the Hudson Motor Car Co., who presented a paper on "Are We Giving the Average Private Operator the Airplane Most Suitable to His Needs?" is an entirely different person from the one for whom the Department of Air Commerce is developing a suitable plane. He does not pilot an air flivver. He is a man of affluence and he likes comfort—but let Mr. Spring sketch him for us:

"He is a man between 35 and 45 years of age, with an income of more than \$20,000 a year. He has piled up a total of about 400 hours in the air, and is now flying between two and three hundred hours a year. His choice of an



**F. M. YOUNG**  
Presided at the Diesel Engine  
session on Wednesday after-  
noon



**ROBERT INSLEY**  
Chairman of the Tuesday morn-  
ing session on Aircraft Engines

airplane is a four-place cabin job, which, complete with all accessories, costs him between \$6,800 and \$7,500. He flies it for two years, and sells it at a loss of between 50 and 75 per cent. Including depreciation, the cost of operation over a two-year period would be around \$6,210, or \$20.10 per hour."

A type of plane that would be better adapted to the needs of the private owner than ships now offered for his use, in Mr. Spring's opinion, would be a quiet, comfortable cabin plane that will carry four people with a lot of luggage at a cruising speed of 200 m.p.h. It should have complete equipment as standard, including simplified blind flying instruments, radio, starter, generator, flares, landing lights, tools, etc.

**I**n Canada, while transcontinental aviation is not being ignored, the great bulk of air travel is now and will for some time remain in the bush and wilderness territory, and the vast majority of customers are among those whose activities are of the pioneering sort, such as mining corporations, prospectors, timber cruisers, surveyors, fur traders, etc. The very nature of the operations implies mobility and flexibility, and the establishment of elaborate bases is impossible. While the home base may be moderately comfortable, the outer terminus is likely to be a sand bar or beach or flat patch of snow in the lee of some sheltering trees or rock. Under these circumstances every airplane must be self-sufficient and must carry all the equipment necessary for its own service and maintenance, and must also carry emergency rations, clothing and fuel for the preservation of the lives of its occupants in the event of a forced landing.

Getting the engines started is attended with particular difficulties in winter time, and these difficulties, and measures adopted to overcome them, were dealt with in a paper by Squadron Leader A. Ferrier of the Royal Canadian Air Force.

# The Production Symposium

In an effort to attract a greater community of interest in its proceedings, the Production Activity scheduled a symposium of papers dealing with a variety of production problems. Five of the seven papers on the program are covered here.

Quite in keeping with the wide discussion of the adoption of some standard method of specifying and measuring surface finish, E. J. Abbott, research physicist, University of Michigan, presented a paper, "What is Surface Finish and How Can It Be Specified?" It deals in the main with the Profilograph method of measuring the physical characteristics of surface finish which was described in detail in *Automotive Industries*, Aug. 19, 1933.

Mr. Abbott points out that the Profilograph is purely a laboratory instrument and that at present the method of analysis is restricted to research projects. He concludes that "For routine checking of finish it appears that visual comparison with standard specimens and special-purpose electrical meters are most promising. In both cases, they should be based on, and correlated with,

profilograms, and the Profilograph be used to settle all arguments. Additional development will also improve the Profilograph."



W. H. McCLOY  
was chairman of the Production symposium



Another development of more than usual importance—the Magnaflux method of detecting seams and surface imperfections in parts subject to dynamic stress—was described in a paper, "Surface Integrity and Dynamic Strength," by A. V. De Forest, asso. prof. of mechanical engineering, Massachusetts Institute of Technology. The Magnaflux test, as is well known, is a rapid production method of inspecting ferrous materials by magnetic means. It detects all kinds of surface imperfections such as cracks, scratches, seams, tool marks, etc., and has been adopted for this purpose by a number of companies.

Apart from the influence of surface imperfections upon failures under dynamic stress conditions, there is also the question of the amount and distribution of initial stress. There is at the present time no general method of attacking this problem," the author explained. "Changes in size due to removing thin layers have been used to study test specimens, but the results indicate only the stresses acting in various directions over large volumes of metals and do not indicate the micro-stress conditions between individual grains. In materials such as brass, subject to corrosion cracking, the stress condition can be studied chemically by the susceptibility of the finished part in an attack by mercury or ammonia. In the case of steel deep etching acts in a somewhat similar manner, but for internal stress this test has not been sufficiently developed. It is well known that the magnetic properties of steel are much influenced by the conditions of internal stress and it is hoped that this form of stress may be developed into a useful tool for the attack of this problem."

The new laboratory at M. I. T. has been established to correlate the experience of practical men, the literature in many fields of science concerning mechanical properties and to develop and apply test methods designed to fill the gaps in our present knowledge of dynamic strength.

## Papers Briefed in this Article

**What Is Surface Finish and How Can It Be Measured?** by E. J. Abbott, University of Michigan.

**Surface Integrity and Dynamic Strength,** by A. V. DeForest, M.I.T.

**Conjugate Camshaft Grinding Machine,** by Howard Dunbar, Norton Co.

**Single Point Boring of Cylinders and Diamond Turning of Pistons,** by W. F. Wise, Ex-Cell-O Aircraft & Tool Corp.

**Modern Resistance Welding in the Automobile Industry,** by P. W. Fassler, P. W. Fassler & Co.

**Other papers presented were Improving Machineability of Alloy Steels,** by W. E. Sanders, Delco Products Corp., and **Triple-Action-Drawing and Redrawing Presses,** by F. J. Rode, M. R. Hatch and E. V. Crane, Toledo Machine and Tool Co.

Howard W. Dunbar, manager, grinding machine division, Norton Company, discussed "1934 Developments in Cam Cylindrical Grinding" which comprised a review of the underlying principles of operation of the Norton Cam-O-Matic grinder, described recently in *Automotive Industries*. Among the outstanding features of this machine are, first, an automatic cycle for high production jobs for either rough or finish grinding; second, a special set-up for smaller production requirements in which the machine will first rough and then traverse in the opposite direction to finish without resetting. The most important feature, however, is the fact the machine is built up of separate units which may be readily removed and changed to accommodate a camshaft of entirely different design.

This principle of flexibility is carried out even further in the design of the new Norton cylindrical grinders. This line is built up of individual units which may be mounted on a single base-line machine permitting many variations such as—mechanical or hydraulic cycles, semi-automatic or full automatic cycles, hand or power control, etc. Moreover, each of these mechanisms is completely interchangeable with the others, so that changes in the machine may be made any time simply by adding new features or exchanging one mechanism for another, with only a moderate capital investment.

"Single Point Boring of Cylinders and Diamond Turning of Pistons," by W. F. Wise of Ex-Cell-O Aircraft & Tool Corp., describes the applications of the Ex-Cell-O precision boring machine for the diamond turning of elliptical pistons and a special set-up for the boring of cylinders to precise limits. An outstanding application of the Junior double-end precision boring

machine is the turning of pistons with an elliptical and tapered skirt. Production per machine is 96 per hour with one operator tending two machines. This method will produce pistons with a limit of 0.0005 in. on the major and

0.0005 to 0.0007 in. of stock is left for the honing operation.

Another set-up was shown boring a V-8 engine block, boring alternate holes or four at a time. Production is 30 blocks per hour, the bores being held within 0.0002 in. of each other on the diameter. The cutting tool is tipped with cemented carbide.

Peter W. Fassler, one of the best informed welding men in the automotive field, presented some interesting angles of production welding in his paper, "Modern Resistance Welding in the Automobile Industry." In this category he includes spot welding, seam welding, butt and flash welding and projection welding.

Among the more important details of the process, Mr. Fassler mentioned the need for welding dies of correct design and composition, and the proper selection of projection welding equipment particularly with respect to power factor which is associated with the design of the unit. By selecting welding machines with high power factor, the industry can save great sums of money, a considerable part of the bill for electric power, according to the author.

The author described a production bar welder for the body front end, welding the shroud, windshield header, and front door pillars in one setting. This equipment was shown in *Automotive Industries* recently. A vital feature of this machine is a high power factor due to the compactness of the unit and the proximity of the transformer to the welding stock.

W. H. McCoy, vice-president of the Production Activity, presided, while Joseph Geschelin, chairman of the papers and meeting committee of the Activity, served as timekeeper to hold the presentations within reasonable bounds.



E. J. ABBOTT  
Presented a Paper on Surface  
Finish at the Production  
Symposium

minor diameters of the ellipse and taper.

Mr. Wise also described a vertical boring machine for single-point boring of cylinders, illustrating a unit which bores eight holes at a time. This set-up is said to hold the bore within a tolerance of 0.0003 in. on the diameter and out-of-round while the axis of the bore can be held within 0.001 in. for parallelism with the crankshaft bores. With the single point boring machine only

## TRUCK BUYING ANALYZED



A. L. CLAYDEN  
Presided at the Fuels and  
Lubricants session

CONSIDERATIONS in the purchase of trucks by fleet owners were analyzed by T. L. Preble, supervisor of automotive transportation, Tidewater Oil Co. Mr. Preble said that many concerns having transportation operations of relatively fixed and constant nature, would benefit from the process of analyzing their highway transport activities in each territory or route from a standpoint of assuming the necessity of purchasing a complete new set of equipment. In effect, it is a process of asking oneself, "If, for some reason, I suddenly found myself without any equipment whatsoever in this territory or route, just what would I buy, and why?"

The subject was dealt with in the paper from the viewpoint of transportation economics, and technical matters of chassis and equipment design were purposely avoided.



L. V. NEWTON  
Chairman of the Transporta-  
tion and Maintenance session

# JUST AMONG OURSELVES

## The Price of Price Fixing

FROM the automotive standpoint, the high spot of last week's NRA hearing on code price and production controls was the letter from the Automobile Manufacturers Association registering the opposition of that organization to all such devices. In taking this position, the car makers were entirely consistent, as it has been common knowledge that from the very beginnings of NRA they had little faith in such controls and no desire to use them.

The AMA position harmonizes closely with the views of a number of members of the National Industrial Recovery Board who have expressed themselves publicly, as well as with the views of an increasing number of business men. They are coming to believe that the price of price fixing powers ultimately is quite comprehensive government regulation, and that it is inconsistent to demand the former and protest against the latter.

On the other hand, there are many business men who are convinced that some sort of protection against destructive price cutting is essential, particularly if wage standards are to be maintained. These conflicting viewpoints present NIRB with the most difficult problem it has to solve.

## N. Y. Show a Sales Success

SALES at the New York Show are reported to have run ahead of last year, increasing the industry's optimism that 1935 would be better than 1934. Attendance also was satisfac-

tory, even though last year's high levels were not reached. The decline in the gate perhaps was not surprising in view of the fact that there were no innovations ranking with independent suspension and the aerodynamic bodies to "pack 'em in." Also there probably were fewer out-of-town visitors.

So far as the public was concerned, there was nothing to indicate that the show was managed by the dealers instead of the manufacturers. Within the trade, however, the difference was noticeable because of the absence of meetings, dinners, etc., which have always featured show week in the past.

Whether the manufacturers will again resume responsibility for the Show next year is for the future to reveal. But there is no doubt that the dealers feel that they have demonstrated their ability to handle the job and that they are desirous of staging the exhibit in the future.

## Correlate Prices With Production

BECAUSE prices of some manufactured articles, automobiles among them, have not declined in anything like the ratio that production has contracted, it is reported that a study by one of Secretary Wallace's aides will soon be published which will advocate the creation of an industrial policy board to control our economy. This failure of prices to react proportionately to falling demand is held to be evidence of monopoly which is said to result from the integration of industry into large units which operate to destroy the free competition ex-

isting when there were a large number of small producers in the market.

The answer to all our economic problems seems to be government regulation. Several million farmers couldn't control the supply, so that job was taken over by the Agricultural Adjustment Administration. Now industry is charged with regulating production too well, so it is urged that it also be supervised from Washington. Apparently, if the individuals in any branch of economic activity, because they are too few or too numerous, can or cannot control supply, the answer is the same—government regulation.

We suggest that at the same time the government takes on the job of correlating industrial prices and industrial production, it take up the problem of correlating industrial taxes with industrial production. One task should be no more difficult than the other.

## If "Spiked" Fuel Were Mandatory—

CURRENT events prove that the motoring public and the automotive industry narrowly escaped a trimming at the hands of perhaps well-meaning but certainly misinformed gentlemen. We refer to the abortive efforts, a year or so ago, to bring back prosperity via the corn belt—converting corn to alcohol and mixing said alcohol with every gallon of gasoline used in most communities. We give you the headline of an article on the financial page of one of the metropolitan dailies: "Traders Buy Corn Expecting Rise." Professional operators expect a sharp rise in corn prices due to the fact that supplies in this country are regarded as the lightest in years. Old white corn in the sample market sold at \$1.04½ per bushel; May corn closed at 90½ cents per bushel. What a stimulating effect this would have on fuel prices if the farm had joined forces, by dictum, with the product of the oil well.

—The Editors.



# Flame Temperature Measure Changes

Data obtained in these tests are discussed under the following headings:

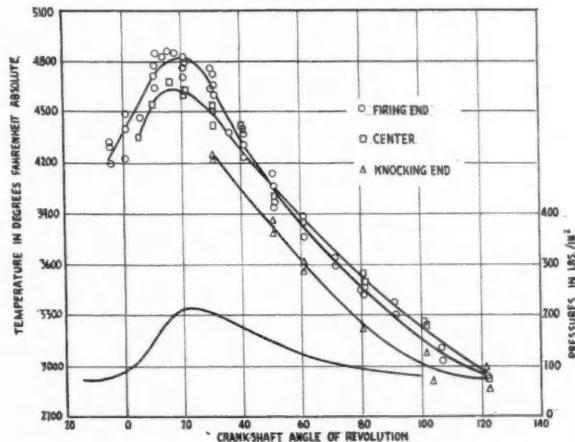
1. Temperatures along lines AA, BB and CC (Fig. 1) with the engine operating under non-knocking conditions.
2. Temperatures along the same lines with the engine knocking.
3. The effect of knock on the temperatures at each of the three positions.

ever, it is important to note that the first point in each curve is not a true flame-front temperature because, owing to the shapes of the flames and the variation in the rate of flame travel from explosion to explosion, the earliest measurement that was practicable in each region was made partially through products of combustion and partially through flame fronts. If, at each posi-

TEMPERATURE measurements of flames in internal-combustion engines running under their own power, by the sodium-line reversal method, were described in a paper by Gerald M. Rassweiler and Lloyd Withrow of the Research Division of General Motors Corp. The experiments of the authors differed from similar ones previously published in that measurements were made, instead of at a single point of the combustion chamber, at three different points, viz., near the ignition point, near the center of the combustion space, and in the region where the last part of the charge burns and where knock occurs if it is present. It was thus possible to study the change in the temperature of the gases near the spark plug as the flames swept on across the combustion chamber and to compare temperatures in different parts of the chamber after inflammation was complete.

In the flame temperature tests the engine was run at 800 r.p.m. with 15 deg. spark advance and a fuel mixture of 12:1, the fuel used being gasoline. The jacket water was maintained at 212 deg. F. and the engine run under full throttle. The knocking series was run with gasoline of 32 octane number and the non-knocking series with 75 octane number.

Fig. 2 — Temperatures measured at three different positions in combustion chamber under non-knocking conditions



4. The temperature gradients along the lengths of the optical paths.

A comparison of the three temperature curves in Fig. 2, obtained under non-knocking conditions, leads to the following observations:

The temperatures, measured soon after the flames appeared in positions AA, BB and CC, do not differ widely from each other despite the differences in pressure at the time the charge inflamed in these three regions. How-

ever, the temperature gradients along the optical paths, measurements could have been extended to earlier angles to obtain values more nearly characteristic of the flame fronts, the results would probably have been lower along lines CC and BB and higher along AA than is indicated by the first points of the corresponding curves in Fig. 2.

Just after inflammation was complete throughout the combustion space, say at 35 deg. after top dead center, there was an appreciable temperature gradient along the length of the chamber. The gases at the firing end were at a higher temperature despite the fact that, after their inflammation, they lost heat to the walls for some time before the gas at the other end of the chamber was inflamed.

The temperature gradient between the two ends of the combustion chamber persists throughout most of the expansion stroke. At 120 deg. after top dead center, the two curves seem to be approaching each other. In fact, at this angle the observed difference in temperature between the two ends of the combustion chamber is not greater than the experimental error, which is

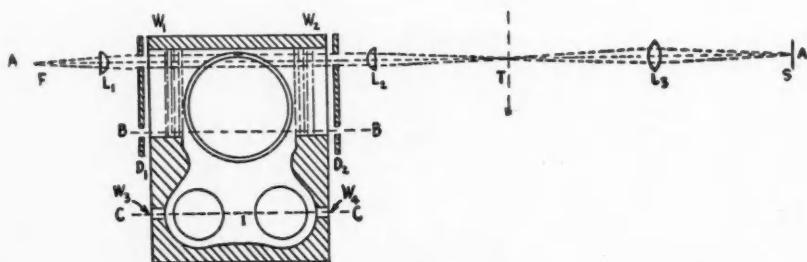


Fig. 1—Plan of the Optical System and Combustion Chamber

# Observations at Three Points During and After Combustion

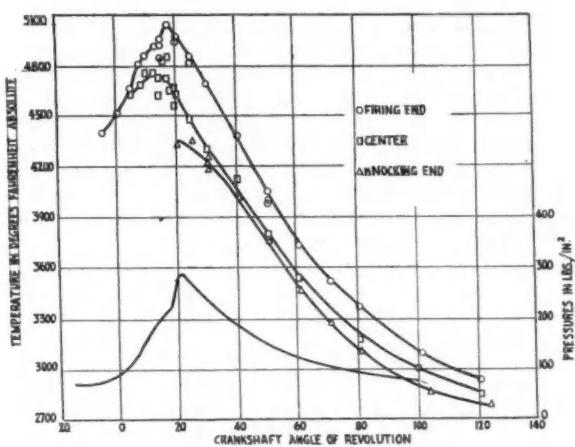


Fig. 3 — Temperatures measured at three different positions in combustion chamber under knocking conditions

larger at low than at high temperatures.

The temperatures at the firing end and at the center approach each other quite rapidly as the piston moves downward. From the geometry of the combustion space, such an effect might be expected because, during the expansion stroke, the gas moving through position BB would come chiefly from the portion of the combustion chamber between BB and CC.

The temperature curves at the firing end and at the center cross at 50 deg. after top dead center. The difference in slopes of the two curves is not great and, consequently, this observation may not be very significant. If the difference is real, it may be caused by movement into the optical path CC or gases which have been cooled by contact with the chamber wall.

Curves of flame temperature with the engine knocking are shown in Fig. 3. Comparing these curves with those obtained when the engine was not knocking, several differences are apparent.

Under knocking conditions the temperatures reach a maximum several degrees earlier than under non-knocking conditions. This difference is produced by rapid inflammation of the portion of charge which burns when the engine knocks.

At all three positions the maximum temperatures measured under knocking conditions are higher than under non-knocking conditions. The difference in maximum temperature may be due, in part at least, to the fact that in the knocking case inflammation is

complete at an earlier angle at which time less energy has been absorbed by the piston and less energy lost to the walls.

During most of the expansion stroke the rate of cooling is greater under knocking than under non-knocking conditions. This observation is most significant. In one case the two curves cross at 50 deg. past top dead center. Obviously the different rates of cooling at this angle cannot be attributed to different rates of expansion under the two conditions. Therefore there must have been greater heat loss to the walls in the knocking case. But at the point of intersection at 50 deg. after top dead center, the greater heat loss to the walls in knocking combustion must be accounted for by differences between knocking and non-knocking explosions other than a temperature difference of the gases.

Emission spectra have shown that the continuous radiation at the red end of the spectrum is stronger under knocking than under non-knocking conditions, that is, there appears to be more black-body radiation in the former case. However on the basis of quantitative measurements, Marvin, Caldwell and Steel have recently concluded that there is very little black-body radiation from either knocking or non-knocking combustion. Second, flame pictures show appreciable mass movements of the gases as the pressure waves set up by knock pass back and forth through the combustion space. The increased degree of turbulence resulting from this cause undoubtedly augments the rate of heat transfer to

the walls. The effect on the engine of the higher rate of heat transfer to the jacket walls is a higher jacket temperature and a greater rate of pressure decrease which results in a loss of power as compared with non-knocking combustion.

The temperature of the exhaust gases is lower when the engine is knocking than when it is not knocking. The greater heat loss through the cylinder walls during knocking combustion appears to be responsible for this difference.

There is experimental evidence pointing to the existence of a temperature gradient along the length of the combustion chamber, the evidence consisting of the "self-reversal" of the sodium line.

Inasmuch as the temperature is not uniform along lines AA, BB and CC, there arises a question as to what temperature is being measured under such conditions by the sodium-line-reversal method. This question is partially answered by the work of Griffith and Awberry, who have shown that, if a measurement is made by the reversal method with two flames at different temperatures in the optical path, the value obtained lies between the temperatures of the two flames. It therefore appears that the engine-flame temperatures reported lie somewhere between the maximum and minimum temperature values on the lines along which the measurements were made.



F. F. KISHLINE  
Who presided at the Passenger Car Engine session



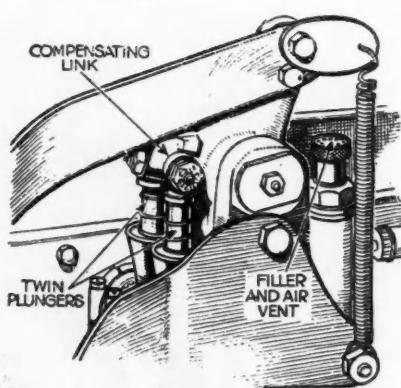
# AUTOMOTIVE ABSTRACTS

## A Diesel Pneumatic Railway Locomotive

**A** DIESEL-PNEUMATIC locomotive known as the Zarlatti of 600-950 hp. is being completed by the Compagnie Franco-Belge de Materiel de Chemins de Fer. It is equipped with two 18 x 22 in. air cylinders whose pistons act directly on the driving wheels. Air distribution is by means of poppet valves. It is estimated that the locomotive will be able to develop a tractive force of 10 tons and that the total weight will be 70 tons. It is equipped with an M.A.N. Diesel engine developing 600 hp. at 600 r.p.m. and 800 hp. when fitted with a Rateau supercharger. The engine drives a two-stage double-acting vertical air compressor, which works with an intermediate pressure of 72 lb. and a discharge pressure of 220 lb. per sq. in. The greatest difficulty with this form of power transmission arises from the extreme cooling of the air with short cut-off. This is controlled by limiting the expansion and injecting water during compression. About 10 per cent of water vapor is introduced into the air during compression. The water vapor in the air condenses during expansion, giving out its latent heat, which prevents extreme temperature drops. Super-saturation of the air is said to be prevented by the inevitable inclusion of fine particles of dust in the air, which act as nuclei and cause condensation in droplets. One result of the addition of water to the air being compressed and used in the air cylinder is that it prevents any considerable difference between the cylinder temperatures during summer and winter respectively.—*The Engineer*, Oct. 19.

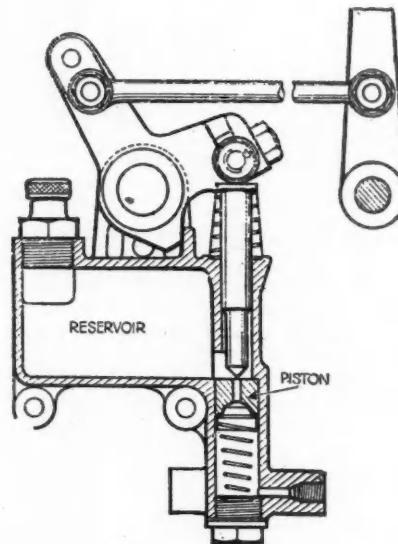
## Improved Hydraulic Brakes

**A** SYSTEM of four-wheel hydraulic brakes which is claimed to retain all of the acknowledged advantages of the usual hydraulic brake and to overcome its disadvantages,



has been developed by F. Harold Hall of Holtford, England. First of all, there are two master cylinders, one of which connects to the brake cylinders of the front wheels and the other to the brake cylinders of the rear wheels, so that

failure in the line at any point will not incapacitate the whole braking system. Secondly, the master cylinders, which are integral with the reservoir, are arranged vertically, and with an air vent in the filling openings at the top, air bubbles will automatically find their way out, provided the master cylinder is above the level of the wheel cylinders. This is arranged by setting the two steel plungers, with tapered or conical ends, above pistons which have a valve passage drilled through the center of their crown, so that when the plunger is depressed it first closes the valve and then operates the piston. When the pedal pressure is released, light springs return the plungers to the normal position, and the valve is opened to release any air through a special port into the reservoir, and so via the filling orifice to the atmosphere.

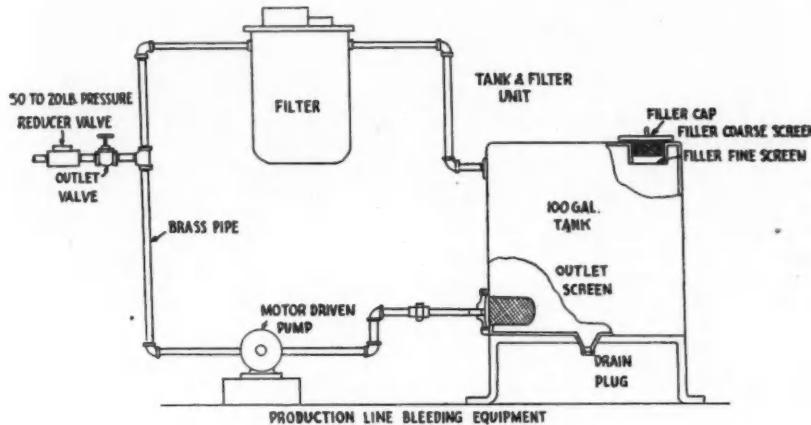


Some other form of compensation between front and rear brakes is necessary to enable the pressure of the hydraulic columns to regain their equality, and this is provided by a simple rolling link above the plungers, which presses down equally on both and is provided with a stop so that one plunger must be operated no matter whether the other one is exerting pressure or not.—*The Autocar*, Aug. 31.

## A New High Speed Engine Indicator

**A** NEW high-speed indicator built by Dr.-Ing. C. W. Fieber of Vienna Technical College, is based on the principle that movements of the pressure element displaces one plate of a differential electric condenser. A Wheatstone bridge is formed by two radio tubes and two resistance units. The grid potentials of the tubes are changed by the variation in capacity of the differential condenser and either a galvanometer or the coil of an oscillograph can be connected across the Wheatstone bridge. One particular form of the instrument, with a specially high rate of vibration of its moving mass, was built for studying pressure fluctuations in the injection lines of Diesel engines.—*A.T.Z.*, Oct. 25.

# Brake Design Pointers



POINTS in brake design were discussed in a paper by Burns Dick of the Wagner Electric Corporation, with special reference to hydraulic brakes. Mr. Dick said at least 50 per cent of the braking effort should be applied to the front-wheel brakes, and with hydraulic brakes, owing to the assurance that there can be no change in the distribution of braking power, designers were justified in applying as

much as 60 per cent of the power to the front brakes. Where circumferential stiffening ribs are applied to the outside of the drums, they must not be of such design as to deflect particles of dust hitting them into the joint between drum and backing plate. The metal piping should be so laid out and clamped to the frame that it will not be affected by vibration. It should not be pulled tight over sharp edges or al-

lowed to rest on the corners of bolts or other points where vibration might wear through the wall of the pipe.

When the compensator, pipe lines, wheel cylinders, etc., have been mounted on the chassis, it is necessary to make provision for removing all the air from the system.

The drawing reproduced herewith shows the bleeder equipment for a factory assembly line. Great care must be taken to avoid any possibility of grit, rust or metal particles being introduced into the car system, and removable screens and filters are provided to prevent this.

Pressure is maintained on the production bleeder line by means of a motor-driven pump. A flexible hose is provided, conveniently located to reach the compensator filler-cap opening on the chassis assembly line, and the fluid is forced through the line and out through the wheel-cylinder bleeder valves by pressure.

## Motor Vehicle Design from User's Viewpoint

**F**L. FAULKNER of Armour & Co. presented Part II of a paper on "Motor Vehicle Design from the Operation and Maintenance Standpoint," Part I of which was presented at the last summer meeting. He discussed particularly the electrical equipment of the truck and the subject of truck rating.

Electric starters are often found inadequate under conditions of severe cold. From an analysis of the battery capacities in relation to engine displacements, Mr. Faulkner came to the conclusion that in some instances, if the engineer on the job had determined the proper size battery to use, the purchasing department must have had the final vote on the subject. To avoid winter starting troubles, manufacturers should adhere more closely to what is now the

average battery size for an engine of given displacement.

In many cases where starting difficulties are experienced it is not because the battery is too small but because the starting motor is not large enough. It is practically impossible to correct such an error in design in the field, especially when the reason for the use of the small starter is that the space available for it will not accommodate a larger one.

Many present-day difficulties in the field which are laid to the storage battery are really due to the generator. Most of the present generators are of the third-brush type, with a maximum output of about 14 amps. with the generator hot. On some trucks the battery will gradually become discharged because of the inability of the generator

to replace the electrical energy that is taken out of the battery by frequent starts.

Many cases of generator failure are due to faults in the application of the generator to the engine rather than in the generator itself. Considerable improvement can be made by deflecting manifold heat from the generator and by providing better cooling facilities for the generator. In some cases where there was trouble from inability to keep the battery charged with generators with third-brush regulation a cure has been effected by the application of voltage control.

As regards ignition equipment, it was found that in the light and medium-duty field, where, because of the use of higher compression and higher speeds, the ignition requirements are most se-

vere, the ignition equipment is the poorest. On the other hand, in the heavy-duty field, where compression ratios and engine speeds are lower, the ignition equipment generally is found highly satisfactory. Ignition equipment is causing most trouble from the maintenance standpoint, partly on account of poor equipment and partly on account of improper training of mechanics and lack of proper test equipment. The author explained that by poor ignition equipment he meant coils of insufficient capacity which cut out at high speeds, condensers of too small capacity and poorly built that break down easily, distributor caps that develop heat cracks, and breaker points that are too light and burn away rapidly. He expressed the view that the truck-operating fraternity would favor reducing the bright parts and plating expense by an amount necessary to install high-class ignition equipment even on the light-duty vehicles.

The author had a good deal to say on the subject of rating. What the operating personnel would like in the way of a truck-rating formula or measuring stick is something that will enable him to size up a certain vehicle as to whether it is a worthwhile transportation unit, and whether it is a unit that is fitted to the particular job he has in mind. Among the appropriate measuring units the author mentions the price per 1000-lb. chassis weight, the advertised price per 1000 lb. of gross vehicle weight, the engine displacement per 1000 lb. of gross vehicle weight, the square inches of braking area per 1000 lb. of gross vehicle

weight, the square inches of clutch area per 1000 lb. of gross vehicle weight, the frame section modulus per 1000 lb. of gross vehicle weight, the diameter of the front-axle knuckle per 1000 lb. of gross vehicle weight, diameter of rear-axle tube per 1000 lb. of gross vehicle weight, and the "gradeability" figured at 20 m.p.h. on the basis of the advertised gross weight. These factors are plotted against the gross vehicle weight ratings, the maximum, minimum and average being plotted for each class.

A detailed comparison of different vehicles on the basis of these data shows many inconsistencies. For such services as milk routes, department store delivery, etc., it is essential that there be plenty of clutch and brake area, as the service involves continuous starting and stopping. For such work a truck in which the clutch and brake areas per 1000 lb. of g.v.w. are low would not be selected.



A. K. BRUMBAUGH  
Chairman of the Truck, Bus and  
Railcar session

## Rubber in Automobiles

"ENGINEERING Uses of Rubber" were discussed by Curt Saurer of the Firestone Tire & Rubber Company. Mr. Saurer said rubber parts used in modern automobiles could be classified into two groups: They either were designed purposely to perform certain functions, or they were installed as an

afterthought to reduce or eliminate noise and vibration, compensate for variations in production, absorb shocks or perform some other insulating function. He listed the various applications and threw interesting sidelights on recent developments in connection with each of these applications.

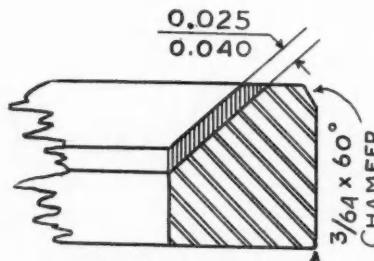
## Details of Jadson Valve Seat Insert Practice

THROUGH the courtesy of the Jadson Motor Products Co., Bell, Cal., we give the details of the Jadson valve seat insert to supplement the general data previously published (see A. I., May 26, 1934, and July 21, 1934).

As illustrated, the insert embodies a bi-metal construction consisting of a ring of high molybdenum steel into which is puddled the surfacing material, a high nickel tungsten chromium alloy containing about 40 per cent nickel.

The ring body is a 0.50 carbon high molybdenum steel having the following physical properties at 950 deg. F.: creep, negligible; elastic limit, 150,000 lb. per sq. in.; modulus of elasticity, 27,000,000 lb. per sq. in.; coefficient of linear expansion,  $6.8 \times 10^{-6}$ .

Seat surfacing material is a special electric furnace alloy of nickel, tungsten, chromium, cast in 3/16 x

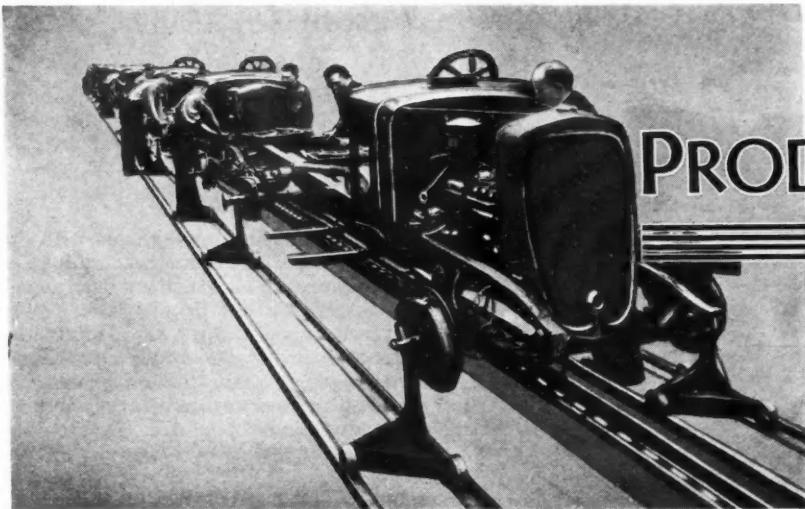


Partial section of the Jadson valve

14-in. rods and bonded to the steel ring by a semi-automatic oxy-acetylene process. It has a hardness of Rockwell 20 C and is said to be readily machinable with standard hand-reaming tools. According to the manufacturer this seat material resists abrasion, valve impact, corrosive action, and other high-temperature effects.

Jadson rings are installed with an interference fit varying with diameter but roughly around 0.003 to 0.006 in. Dry Ice is recommended for freezing the ring at assembly, rings being kept in contact with the ice for at least 15 min. After the rings are in place the block material around the counterbore is peened over against the chamfer.

More than 50 per cent of the motor cars and trucks now manufactured in Great Britain are equipped with Lockheed hydraulic brakes, according to an announcement made at a recent meeting of the Whitworth Society, which included a visit to the plant of the Lockheed Hydraulic Brake Company, Ltd., at Leamington. Interchangeable parts and uniform screw threads are used on Lockheed brakes manufactured in different countries.



## PRODUCTION LINES

### Hard-Faced

One of the heavy-duty truck makers has taken another step forward in extending the service life of hard-worked elements. What they have done is to weld a Stellite facing on the contact areas of clutch throwout fingers.

### Marches On

Met a widely known engineer the other day, one who has been the best friend but severest critic of the diesel engine for bus and truck power. The development of this power plant has advanced so far in the few years since he investigated it that he has become a firm ally. When this man puts his stamp of approval on the diesel or anything else pertaining to truck design, it's got to be good.

### Knee Action

Naturally much has been learned about knee action during the past year of intensive activity in the laboratory and on the road. We are told by one of the men most active in this development that he is now recommending zero camber for knee wheels. It seems that camber is *persona non grata* in the new geometry.

### Bright Finish

Speaking of form reversal, take the matter of bright finish. Last year chromium plate for the exterior seemed to be on the way out except for small areas. This year the bright plate is back in full bloom. It's done in better taste, of course, but you will find it on grilles, moldings, hardware, orna-

ments, etc. And interestingly enough, quite a few jobs feature large headlamp bodies finished completely in chromium plate.

### New Finish

Ford is the first to try out the new hardware treatment on production cars. All hardware is die cast in aluminum and finished in dull color by a special anodic treatment. This is quite a step from the usual plated finish to which we have been accustomed.

### A Contrast

Duesenberg presented a study in contrasts at the New York Show. Here amid the latest offerings of the whole industry was a luxurious town car in subdued styling. It was reminiscent of the coach work of yesteryear what with the sharp lines of the body, exterior finish, and the steps. In fact, its appearance belied the long hood that concealed a mighty source of power. Just the car that certain people will want for a comfortable trip to the country or watering place.

### Paint Pays

Vol. 1—No. 1 of a new house organ, *Paint*, by Sherwin-Williams, has just come over our desk. It's a handsome thing in blue and white, covering every phase of industrial painting in easily read shorts. An unusually effective touch is added by the center spread treatment which features novel photographic studies. This should be of interest to everybody and particularly advertising men on the look-out for ideas. Subscription is free to our friends.

### Radial Power

Curiously enough, one of the quietly sensational things at the New York Show was neither an automobile nor an accessory. It was the 10-cylinder two-cycle radial diesel developed by Continental for railroad power. The engine is built integrally with the generator and the over-all length of the unit is at least six feet less than an in-line or V powerplant of the same rating, something over 600 hp. May we say that this job attracted more than usual comment among the engineers who tramped Grand Central Palace.

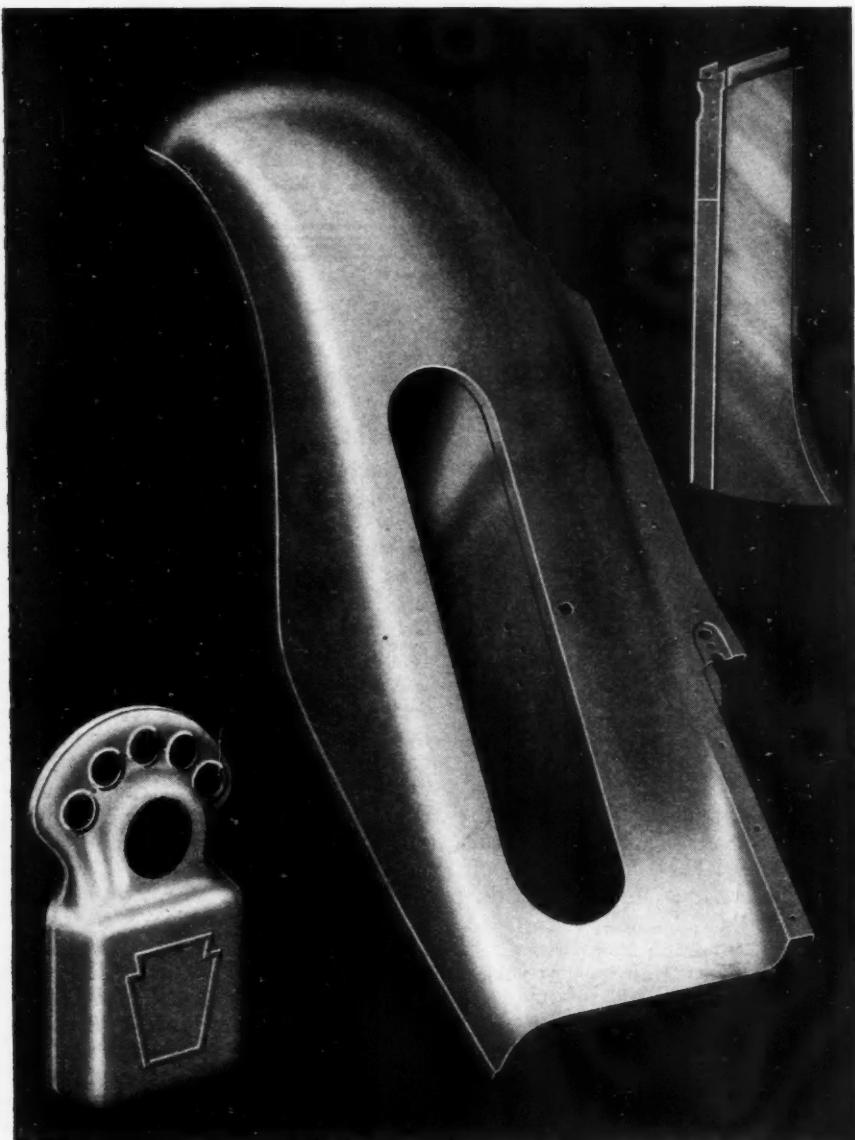
### New Deal

Sex appeal didn't enter the picture at the New York Show this year. It was a straightforward job of presenting the good-looking 1935 models, featured by chassis displays and the ever-present chassis elucidators for almost every exhibit. Nash added some color by shrouding the chassis in a black booth, the component parts being displayed through the medium of vivid, glowing phosphorescent colors. Both Ford and Chevrolet played to a full house by a demonstration of assembling and disassembling the engine in record time.

### Drops Out

One of the most successful industrial designers in this country has told us that he has finally decided to abandon the idea of styling some high production car. He has some sparkling ideas as to what a car exterior should be. But he finds no receptive ear, and more's the pity.—J. G.





## DEEP DRAWN--WELDED

Not a "tough" job for York, but part of our regular run-of-the-shop production. The large fender in the center of the illustration shows one of the big jobs which we are turning out regularly. We are just as capable and just as careful with the hundreds of little jobs which are sent here to be done right. Come to York for stampings.

YORK CORRUGATING CO., YORK, PENNA.



# YORK STAMPINGS

January 19, 1935

### Triplex Heavy Duty Air Cleaner

An oil-bath-type air cleaner, known as the AC Triplex heavy-duty air cleaner, has been introduced by AC Spark Plug Company. It is recommended for use on engines in extremely dusty territories.

It is quickly interchangeable with the silencer and air cleaner installed on the carburetor as standard equipment and is claimed not to affect the power and economy in any way. It is designed especially for direct attachment to downdraft carburetors on passenger-car engines or trucks equipped with



the same engines as used in passenger cars of the same make.

The cleaning operation is simple. After the top cover has been removed, the filter-element assembly is lifted out, washed in gasoline, and allowed to drain thoroughly. Excess oil in the base is then emptied out and the accumulated mud scraped out. Then the entire oil base is washed in gasoline and filled to the indicated level with one pint of S.A.E. 50 engine oil.

Cleaning periods vary greatly with operating conditions. Under extreme conditions, such as road-construction work, once a day is sometimes necessary.

### Six Spindle Automatic Screw Machines

To meet the need for frequent changes of design in the product the National Acme Company, Cleveland, Ohio, is introducing a new line of Six Spindle Automatics, to be known as the Model "R," which will supplement the new line of Four Spindle Automatic Screw Machines announced early this year.

The Six Spindle and Four Spindle Model "R" machines are built on the same frames, and uniform in design so that an operator can run machines of different sizes, four or six spindle, in one group without confusion. So far as possible, machine parts, tooling and attachments have been made interchangeable, so as to reduce the investment required. Furthermore collets and pushers for corresponding sizes of machines are interchangeable. The new Six Spindle Model "R" machines are built in four capacities; 9/16 in., 1 in., 1 1/4 in. and 1 1/8 in.

A distinctive feature of the Six Spindle Model "R" is the arrangement or spacing of the spindles in the spindle

Automotive Industries

# NEW DEVELOPMENTS

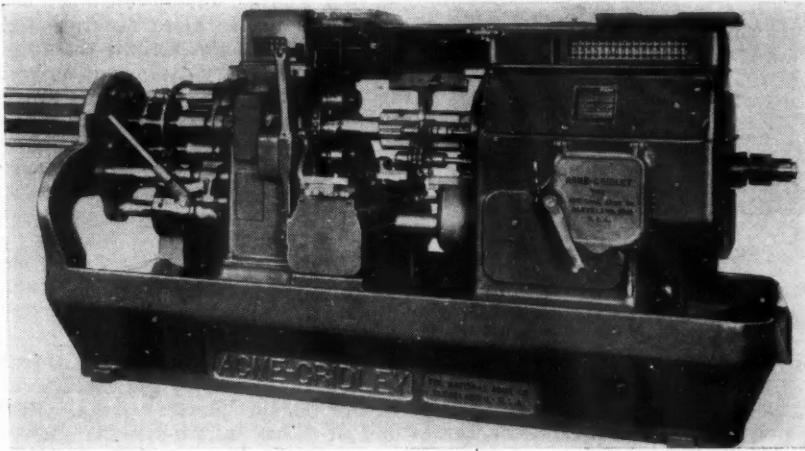
## Automotive Parts, Accessories and Production Tools

carrier. The two spindles at the top and the two at the bottom are in line for direct application of tooling from the four heavy independently operated cross slides. The two spindles at the sides (2nd and 5th positions) are accessible for a "short coupled" double deck tool holder or an independent cross slide if required.

These machines are regularly pro-

carrier mechanism. This eliminates torsional strain and whipping action to the spindle carrier.

To employ both forming tools and drills at the correct relative surface speeds for each tool, high speed drilling attachments can be used in any or in all six positions—driven directly from the center gear mounted on the end of the spindle carrier stem. Only



vided with stock stop in the sixth position, but can be furnished when this is specified, with stock stop in first position. The stop is brought into position by mechanism that is entirely enclosed.

Another distinctive feature is the stock reel and method of indexing it. The front disc of the stock reel turns in a reel guide which is mounted directly on the end of the frame and pan. The stock reel is indexed by power through shaft and gear from spindle

one drive is required from the gear box to this center gear.

The Six Spindle Model "R," is arranged to thread in the third or fourth position, or both, in all sizes, and the same slide and operating mechanism, in either position, can be used for accelerated reaming or turning operations. These two die slides are independent of the main tool slide and of each other as they are each operated by a separate cam.

### Broaching Lathe

The broaching lathe just introduced by Wickes Brothers, Saginaw, Mich., is a new development in which the part being machined is revolved on its axis during the broaching operation. Patents pending cover its new features.

This machine has been developed for rough and finish turning, filleting, facing and shouldering the external cylindrical surfaces of various machine parts. The part illustrated in the machine is a cast alloy crankshaft and the operation is the turning, filleting and facing of the three main bearings and the pulley diameter adjacent to

the front bearing. The broaches are arranged for both roughing and finishing operations and the work performed is very accurate as to roundness of the parts and as to diameters. The broaches are designed to provide free cutting at all times and to carry the chips away from the fillets and shoulders.

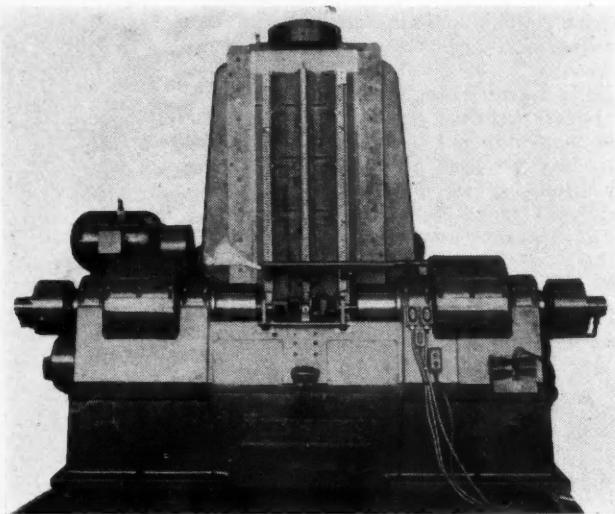
One of the features of the broaching lathe is the high production obtainable and the long life of the broaches. This machine is said to produce approximately  $2\frac{1}{2}$  times the number of crankshafts per hour which can be obtained from the most modern double-end drive lathes using conventional

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# NEW DEVELOPMENTS

## Automotive Parts, Accessories and Production Tools



high-speed cutting tools. One reason for the high production obtainable is the small amount of time required for tool changes, since the wear on the broaches is almost negligible. The broaches will produce from 50 to 100 times the number of pieces per grind that can be obtained with the best high-speed tool bits. A broach has been used in actual production for over a year by several companies in broaching the center bearing of a crankshaft from the rough and a production of 5000 to 8000 forked cranks were obtained for each sharpening.

The machine is equipped with hydraulic chucks and is semi-automatic in operation. The feed to the broach slide is by means of a very large diameter screw and an extremely heavy bronze nut adjustable for wear.

The main drive is by means of a 20-hp. motor with a 10-hp. motor for the feed to the broach slide. A 2½-hp. motor is used to drive the hydraulic pump for the hydraulic chucks and for the hydraulically-operated steady rest. The machine has a total weight including motors and electrical control of approximately 41,000 lb.

### Horizontal Hone For Long Cylinders

Barnes Drill Co., Rockford, Ill., has placed on the market a horizontal honing machine, hydraulically operated, for the honing of tubes and very long cylinders. Several unique features are incorporated, including the method of reciprocating the carriage, on which is mounted the spindle, driven from the electric motor on carriage. A fluid motor is used (not shown) which gives the full hydraulic influence, the same as that of a hydraulic cylinder, yet makes possible a much shorter length of main bed.

One master lever at operator's station near middle of machine controls starting and stopping of spindle rotations, also starting and stopping of spindle reciprocations. Auxiliary means is supplied for short stroking at any point in the entire spindle travel,

a desirable feature for removal of taper and high spots in cylinder.

This No. 5 Hydraulic Horizontal Honer handles all bores up to and including 5 in. diameter in iron or steel. While here shown with 6 ft. spindle travel, the machine can be furnished

for such longer or shorter travel as required. Outer work supporting bed contains coolant reservoir and our efficient filter of large capacity.

Coolant is fed through anti-splash guard from rear end of tubing and the overflow is carried through oil channels to front end of work supporting bed where it cascades into the settling tank and is automatically filtered—a very essential feature—before going back to the work.

### Single-Filament Automobile Lamp

A new prefocused, single-filament automobile lamp for spotlight and auxiliary-driving-light service has been developed by the Incandescent Lamp Department of General Electric Company at Nela Park, Cleveland, Ohio.

The use of the prefocused base with the new single-filament construction is claimed to insure more accurate light control and to make possible the design of smaller auxiliary equipment, in keeping with the modern trend toward streamlining.

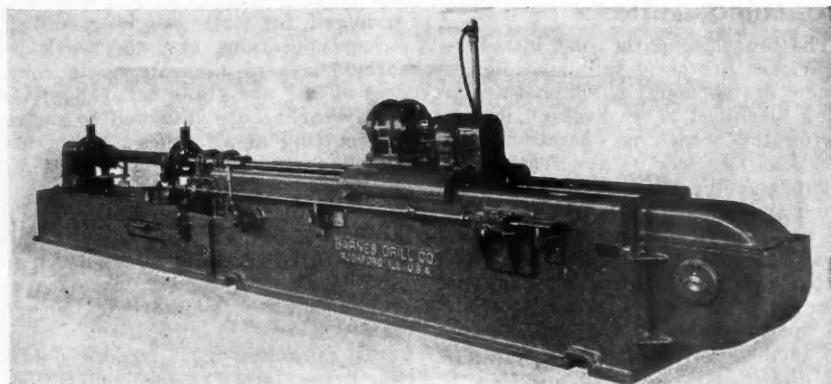
The new lamp, which has a 32-candle-power, 6-8 volt filament, is designated as MAZDA lamp No. 1321.

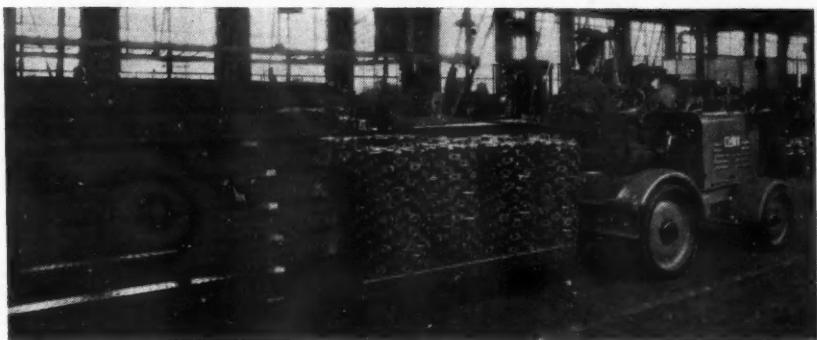
### Clarktor-6 Industrial Tractor

A new all-purpose industrial tractor has been announced by the Clark Tractor Co. of Battle Creek, Mich. Clarktor-6 has a six-cylinder power-plant rated at 46 hp. and its designers claim that it is capable of delivering a drawbar pull of one pound per pound of tractor weight.

A heavy-duty Clark transmission and a double-reduction rear axle make a wide range of speeds available, up to 18 m.p.h. All models have a self-starter, generator, battery, electric horn, front-bumper plate, eye coupler and pneumatic tires. Lights are available on all models, to facilitate night operation. Included in the extra equipment available are dual pneumatic or solid tires, special couplers, a Clark condensing muffler, speedometer, and front fenders.

The line comprises three models—a





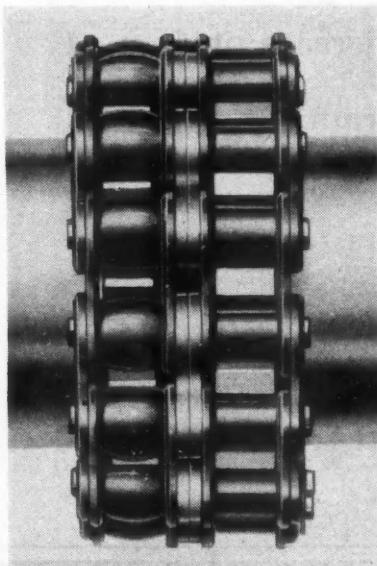
Clarkstor-6 Industrial Tractor

light model for general industrial use, a speed model specially suited to service at airport hangers and country clubs, and a heavy model for heavy towing service, such as spotting or shifting freight cars on warehouse sidings.

### Baldwin-Duckworth Flexible Coupling

The patented flexible chain coupling illustrated has been designed by the Baldwin - Duckworth Chain Corp., Springfield, Mass., to provide for free operation without friction and excessive noise. This is accomplished by the use of special double width roller chains. One strand of the chain is equipped with the standard cylindrical rollers whereas the other strand has convex surface, oversize rollers which provide for free operations where shaft deflection and misalignment exist. Permanent shaft deflections up to three degrees can be handled without undue strains, thus taking care of shaft joints with wobbles or permanent eccentricities.

This coupling is self-aligning and does not require the added cost of the oil-tight case or housing. The special heat-treated convex rollers are said to operate freely on the hardened sprocket teeth without binding or undue wear.



SCHEDULED air lines operating within the Continental United States carried 54,835 passengers in August, 1934, as compared with 65,181 in August, 1933, according to reports to the Bureau of Air Commerce. The amount of express goods carried was 190,440 lb., as compared with 123,227 in August of 1933. Twenty-three companies reported for August, 1934, as compared with 27 for August, 1933, and the mileages flown were 21,357,741 and 22,797,942 in August, 1934 and 1933 respectively.

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# Salute the

True to tradition, the automotive industry was last to show the effects of the slump, and first to stage a comeback.

Because this industry carried on with high courage, while others were content to "wait for better conditions," the automobile business remained good for a full year after other businesses had stopped trying, and its recovery program was in successful operation more than a year in advance of other businesses.

Not until 1931 did the automotive industry fall a reluctant victim to world conditions. Yet by 1933 it had already gone a long way towards recovery, with a 39% increase in sales and a 38% increase in production, although there was a decline in the total number of cars in use, as evidenced by registrations.

Then, in 1934, there was the extraordinary increase of 45% in production! But, what is much more significant, registrations increased for the first time since 1930!

There will be substantial further gains this year, the estimates of leading executives ranging from 15% to 25%.